Imperial Agricultural Bureaux

Eighth Annual Report

OF THE

Executive Council

1936-1937

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1938

CONTENTS

	Page
Preface	3

REPORT

A. British Commonwealth Scientific Conference, 1936	4
B. Executive Council	6
C. The Bureaux	6
D. (i) Imperial Institute of Entomology and Farnham House Laboratory	11
(ii) Imperial Mycological Institute	17
E. Research Schemes.	18
I. Low Temperature Research	18
II. Wool Research—Torridon	19
III. Stored Products Research Laboratory, Slough	19
F. General	21
G. The Journal of Dairy Research	21
Statements of Account :—	
Imperial Agricultural Bureaux	22
Imperial Institute of Entomology	23
Imperial Mycological Institute	25
Farnham House Laboratory	26

APPENDICES

I. British Commonwealth Scientific Conference, 1936. Summary of conclusions and recommendations	28
II. Imperial Institute of Entomology. Report for 1936/37	33
III. Imperial Mycological Institute. Report for 1936/37	40
IV. Farnham House Laboratory. Report for 1936/37	43
V. Publications	49
Addresses	58

PREFACE

Many delegates to the Imperial Agricultural Research Conference, 1927, especially those from Overseas, stressed the difficulties they had experienced in obtaining information in different countries of research in various branches of agricultural science and in getting into touch with research workers in other countries. The Conference felt that these common difficulties should be met by a common effort.

2. It accordingly recommended that eight bureaux be established to collect, collate and disseminate information on research in selected branches of agricultural science, and generally to assist research workers in the Empire with information on their subject and with introductions to other research workers. Each bureau was to deal with one of the following branches of agricultural science and be located at an Institute already well known for research in its branch.

Soil Science	Plant Genetics (other than Herbage)
Animal Health	Plant Genetics (Herbage)
Animal Nutrition	Fruit Production
Animal Genetics	Agricultural Parasitology

The cost was to be met from a common fund formed by contributions from Empire Governments.

3. These proposals were accepted and a scheme for the finance and administration of the bureaux was prepared at a representative meeting held in London in November, 1928. The acceptance by governments of this scheme brought into being a new type of Imperial organisation. Since 1st April, 1929, a service of common Empire interest has been maintained from a fund jointly subscribed by the Governments of the Empire and administered by an Executive Council composed of representatives directly appointed by the governments for that purpose.

4. By locating the bureaux at selected research institutes the officers are in daily touch with men engaged in research in their own subject and profit by the guidance and assistance of the Heads of those Institutes. The organisation controlling each of the selected Institutes has allowed the Head of that Institute to act as Director of the Bureau. Each bureau thereby receives the help which only men of wide experience and scientific distinction can give. Other officers of the bureaux are whole-time servants of the Council.

5. In addition, each bureau has in each country of the Empire an official correspondent, who is " the general friend " of that bureau in that country. These official correspondents are appointed by the different governments of the Empire for their interest in the particular branch of science with which a bureau deals.

6. On the adoption by governments of the recommendations made by the Imperial Committee on Economic Consultation and Co-operation, the Executive Council was made responsible for the supervision of the administration and finance of the Imperial Institute of Entomology and of the Imperial Mycological Institute with effect from 1st October, 1933.

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REPORT

At its meeting on 30th March, 1938, the Executive Council of the Imperial Agricultural Bureaux adopted the following report relating to its eighth year's work—1st April, 1936, to 31st March, 1937.

A. *British Commonwealth Scientific Conference*

The chief event of the year was the British Commonwealth Scientific Conference. The Imperial Committee on Economic Consultation and Co-operation in its report which was accepted by all governments in 1933 recommended that certain principles should be observed regarding the control of " inter-imperial agencies organised and financed on a co-operative basis." Among these were

> " (*a*) The complete constitutional equality of the participating governments should be recognised in the method of appointment to, and composition of, each agency.
>
> (*c*) Adequate financial provision should be forthcoming. This implies not only sufficient funds but also a reasonable certainty of income over a definite period of years.
>
> (*d*) At the same time there should be careful and periodical examination of the various institutions at Empire conferences suitable for the purpose as without this assurance governments could hardly be expected to provide financial support as visualised in (*c*) above."
>
> (*vide* page 94 of the report).

2. The British Commonwealth Scientific Conference of September–October, 1936, was the first of those Empire Conferences at which the work of the Executive Council and all the activities under its charge were brought under this " careful and periodical examination." The Conference was attended by the administrative and scientific heads of departments and national research organisations in the various parts of the Commonwealth directly interested in the work of the institutes and bureaux under the Council. It also afforded the first opportunity open to the Executive Council since its creation in 1929 for joint discussion and consultation with the official heads of those departments. As such it was particularly valuable.

3. The Conference lasted from September 21st to October 8th, 1936 All the institutes and bureaux were visited and details of their work discussed with the Directors and Deputy Directors. It proved difficult to compress the work which had to be done in the time allotted for the Conference. Sir Charles J. Howell Thomas, K.C.B., K.C.M.G., United Kingdom, was elected Chairman of the Conference and Major-General A. G. L. McNaughton, C.B., C.M.G., D.S.O., Ll.D., M.Sc., President of the National Research Council of Canada and Dr. P. R. Viljoen, Secretary for Agriculture and Forestry in

the Union of South Africa, Chairmen of the two Committees which considered in detail the various subjects before the Conference.

4. The report of the Conference was unanimous. The summary of its conclusions and recommendations is given in Appendix I. The report has since been accepted in full by all governments of the British Commonwealth and published. The Conference approved of the work of the existing institutes and bureaux, and of the control exercised over them as co-operative inter-imperial services organised for a common purpose on the basis of constitutional equality and joint responsibility. The Conference defined more clearly the scope and relations of some bureaux, advised an extension of the activities of others, recommended the formation of two additional bureaux—one for Forestry and one for Dairy Science—as part of the general bureau scheme and the continuance of the Laboratory for Biological control of insect pests and weeds established at Farnham House. It recommended the finance which it considered adequate until 31st March, 1942, for these varied activities all of which should continue under the control of the Executive Council and recommended that the next periodical examination should take place in the summer of 1941.

5. The Conference undoubtedly promoted a clearer understanding both of the constitutional position of these organisations as common agencies co-operatively controlled, of the service they are in a position to render, and of the advantages, which scientific and departmental officers should gain from their full use. Several of the recommendations were directed to making the purposes of the bureaux better understood and their services more widely used. Among these was the proposal that the appropriate department in each country should appoint one of its officers to act as a liaison officer for the Council and bureaux. His duties were defined as follows :—

> " (i) to become thoroughly familiar with the principles underlying bureau organisation, with the scope of the various bureaux, with their progress, and with the distribution of their literature;
>
> (ii) to further the knowledge of the various bureaux among the research workers in the area he represents and by suggestion and advice, either to bureau officers or to research workers and others in his area, to promote the usefulness of the bureaux generally, either by the communication of programmes of research work or otherwise." (*see* para. 27, page 28 of the Conference report).

His duties thus supplement those of the existing " official correspondents," each of whom being usually a specialist in a particular subject has been nominated in each country as the special correspondent in that country for the bureau dealing with that subject.

6. In addition to these and other matters—*e.g.* the distribution and sale of publications—connected directly with the work of the institutes and bureaux, the Conference considered and made recommendations on several other matters

such as questions which had arisen from the specialist Imperial Mycological and Entomological Conferences of 1934 and 1935 respectively; the general question of specialist and general scientific conferences; the interchange of research workers; collaboration in the collection and maintenance of plant material for crop improvement; questions connected with certain research activities to which financial aid had been contributed through the Executive Council, viz. the transport and storage of foodstuff, the properties and utilization of wool, the control of insect infestation in products when stored, and the future of the Journal of Dairy Research.

B. *The Executive Council*

7. With the close of the Conference Sir Charles J. Howell-Thomas, K.C.B., K.C.M.G., resigned the Chairmanship of the Council, having occupied that position for a little over two years. Mr. Nevill L. Wright, the representative of New Zealand, was elected as Chairman and Lt.-Col. G. P. Vanier, D.S.O., M.C. (*Canada*), as Vice-Chairman.

8. Newfoundland having joined the bureau scheme, Mr. D. James Davies took his seat on the Council as its representative.

C. *The Bureaux*

9. *Personnel.* No changes occurred among the senior staff of the bureaux.

The post of Deputy Director at the bureau of Animal Genetics (Edinburgh) remained unfilled throughout the year. Miss Cytovich who was in charge has done extremely well in developing and keeping up-to-date Animal Breeding Abstracts.

10. *Accounts.*—The audited statement is attached. Owing to the participation of Newfoundland in the bureau scheme, the normal annual contributions from governments were increased by £125 to £21,795 from £21,670. Receipts in the year amounted to £21,926 13*s.* 9*d.* owing to certain payments being made in advance.

All contributions due for the year for the bureaux, and the various research schemes wholly or in part financed through the Council were received.

Two items on the receipt side, viz. the Journal of Dairy Research (£34 1*s.* 9*d.*) and Potato Expedition to South America (£195 10*s.* 6*d.*) are referred to later in this report.

11. *Expenditure.*—Net disbursements (i.e. after deducting receipts from sales) showed in total little difference from those of the preceding year, £23,852 1*s.* 8*d.* as compared with £23,628 15*s.* 6*d.* The latter sum, however, contained in the Headquarters an item of £443 15*s.* 1*d.* attributable to the year 1934–35. Also the accounts for 1935–36 included a charge on the Council funds

of £288 for the Journal of Dairy Research. The net increase on the cost of the bureaux and headquarters in the year was £955 1*s.* 6*d.*

	1935–36			1936–37		
	£	*s.*	*d.*	£	*s.*	*d.*
Net expenditure at the eight bureaux ..	20,103	0	6	21,081	4	6
Net expenditure at Headquarters for 1935–36	2,793	19	8	2,770	17	2
Net expenditure at Headquarters attributable to 1934–35	443	15	1	-	-	-
Journal of Dairy Research	288	0	3	-	-	-
	£23,628	15	6	£23,852	1	8

The chief increase, £622 10*s.* 11*d.*, was at the bureau of Animal Health—Weybridge—where a printing bill amounting to £156 and relating to the previous year had been left unpaid at the close of the year as some items therein were then under discussion.

12. The excess by which net expenditure exceeded normal annual contributions (£21,795) was met from interest on investments and accumulated balances. This was in accordance with the recommendation of the Imperial Committee on Economic Consultation and Co-operation of 1933 which was endorsed by the British Commonwealth Scientific Conference of 1936.

13. Receipts from sales of publications.

Receipts from Sales of Publications

(*Other than Nutrition Abstracts and Reviews*)

	1930–31	1931–32	1932–33	1933–34	1934–35	1935–36	1936–37
	£	£	£	£	£	£	£
Soil Science..	6	51	57	73	103	404	276
Animal Health	116	756	735	1,161	1,328	1,287	1,373
Animal Nutrition	—	19	54	22	16	20	12
Animal Genetics	—	7	12	79	151	160	156
Fruit Production	3	55	61	115	126	160	151
Plant Genetics (Herbage)..	—	38	54	83	136	208	217
Plant Genetics (Non-Herbage)	1	46	77	123	128	131	268
Agricultural Parasitology..	—	13	15	18	22	353	295
Headquarters	—	4	15	5	13	4	46
Total	126	989	1,080	1,679	2,023	2,727	2,794

The receipts from the sales of Nutrition Abstracts and Reviews are not included in the above table. The Medical Research Council also contributes

to the production of this journal. A separate account is kept to which receipts from sales are credited. The price of this journal was raised from one to two guineas with effect from July 1936. The journal was first started in 1931–32. In spite of the increase in the price of the journal in 1936–37 the number of subscribers only fell by 9 from 837 to 828. Receipts have been as follows:

1931–32	1932–33	1933–34	1934–35	1935–36	1936–37
£	£	£	£	£	£
632	840	841	973	1,168	1,920

In 1936–37 total receipts from sales of bureau publications realised £4,714 or more than 20 per cent. of the annual contributions—viz. £21,795. Over two-thirds of the receipts are obtained by the bureaux of Animal Nutrition and Animal Health.

As is customary a considerable number of copies are distributed free for the use of officers and departments of contributing governments. The sale price of those so distributed exceeded £1,750.

14. These figures show that the publications issued by the bureaux are meeting a real need. In its report, which has already been referred to, the Conference recorded its opinion that " these publications, each in its own subject, provide the most adequate means by which the research worker can secure information in regard to the state of research in his own branch of agricultural science." " Certain of the delegates stated their intention of advising their governments to take steps to ensure that their officers are in possession of the respective journals; and the financial proposals made later in this report (i.e. in the report of the Conference) have been based on the assumption that during each of the next five years, owing to the action which governments will take, either directly or through their liaison officers, the revenue derived by the bureaux from sales of publications will be very substantially increased."

15. An important feature which had appeared in each of the two previous years continued throughout 1936–37. It has affected every bureau. As will be seen later in this report it has also affected the institutes of entomology and mycology. In the bureaux, which are younger than the institutes, some of the increase in the number of abstracts and expansion in the size of their journals is the result of the bureaux having become more expert at their work, and of requests made by departments for greater attention to particular branches of their subjects. This, however, does not account for the whole of the increase in output from the bureaux, nor does it apply to the two older institutes. It is an undoubted fact that the output of literature in the world in practically every branch of science has substantially increased and is increasing. In 1936 the number of abstracts published in the bureau journals, amounting to over 16,000, were twice as many as those in 1932.

The bureaux have kept abreast of the demands thus made upon them. Only at Animal Health (Weybridge) where difficulties have occurred through

lack of accommodation—now being remedied—and staff changes, have any arrears accumulated.

16. *Technical Communications.*—In addition to these abstract journals which afford the best guide available to current literature, the bureaux prepare and issue from item to time reviews with bibliographies of research on particular problems. Amongst such issued in 1936–37 were the following special reviews :—

Vegetative propagation of tropical and sub-tropical fruits.
Horticultural aspects of woolly aphis control.
Nutrition research in the British Colonial Empire.
The experimental production of haploids and polyphoids.
An outline of cytological technique for plant breeders.
The South American potatoes and their breeding value.
Composition of some African foods and feeding stuffs, mainly of vegetable origin.
Methods for the chemical analysis of biological material in nutrition investigations.
Grassland and forage crops in the Union of South Africa.

17. *Potatoes from South America.*—In recent years the potato has become of increasing importance as an article of food in India. The European varieties accustomed as they are to the long light days of northern summers are not suited to many of the Indian conditions; also some suffer badly from disease. The Imperial Council of Agricultural Research in India accordingly decided to establish one or more potato breeding stations from which it is hoped to evolve strains suitable for Indian conditions. In several other portions of the British Commonwealth breeding work on potatoes to obtain strains resistant to local diseases is in progress. In Russia much attention has in recent years been given to potato breeding; also, though to a lesser extent, in Germany and Sweden. Recent European experience has suggested that, if genetical work is to be based solely on the varieties available in Europe, the chances of obtaining the qualities required are greatly restricted. Greater chances of success are likely to be obtained by using some of the wild varieties which are to be found in the Andes. Also in the more tropical latitudes the conditions of light are fairly similar to those in India, whilst on the higher parts of the mountains are to be found varieties able to withstand a certain amount of frost—a matter of some importance in some Empire countries. The bureau of Plant Genetics at Cambridge had drawn the attention of plant breeders to the work going on in Russia on potatoes and the conclusions to which that work was pointing. India, about to start prolonged scientific work on potato breeding, informed the Council of its desire to obtain a collection of these Andean potatoes. It suggested they would probably be of interest to plant breeders in other parts of the Empire and it intimated its willingness, if other portions of the Empire would join, to co-operate in sending a trained botanist to the Andes to make

such a collection. It suggested that the Executive Council should organize and control the expedition. All other Empire countries were asked for their views. They approved the proposal and expressed willingness to participate.

18. A favourable opportunity occurred in the winter of 1936. It happened that a zoological expedition was leaving Cambridge in March 1937 to examine the flora and fauna of Lake Titicaca—a lake situated high in the Peruvian Andes. This lake was close to one of the areas in which these potatoes were likely to be found. It seemed in every way advantageous to attach to this expedition the botanists whom the Executive Council might send in quest of these potatoes. The Council agreed to place in charge Dr. P. S. Hudson, the Deputy Director of the bureau of Plant Genetics at Cambridge, and an assistant was secured to go with him. Arrangements were made for the expedition to start at the end of March 1937; but Dr. Hudson who had not been well for some weeks fell seriously ill. It was out of the question for him to go, and very regretfully the Council had to postpone the expedition for that season. The facts were reported to governments who agreed to this postponement. The entry in the receipts side of the audited statement refers to payments which had been made in expectation that this expedition would start in March, 1937.

19. *Journal of Dairy Research.*—As an interim measure until such time that the question of the future of this journal could be considered at a suitable Commonwealth Conference the Executive Council had undertaken to supervise its administration with effect from 1st October 1933 and to make good in the years 1934–35 *et seq.* any deficiency which might occur up to a limit of £250 in any one year. The journal has steadily increased in standing, authority and in circulation. It appears three times a year instead of twice as prior to 1933. No free copies whatever are issued. The rate of annual subscription was raised in November 1933 to 25*s*. The subscribers in each year since its inception in 1929 have been, as follows :—

Vol. I	192	Vol. V	276
Vol. II	195	Vol. VI	306
Vol. III	229	Vol. VII	337
Vol. IV	239		

Senior officers at the National Institute for Research in Dairying, Shinfield, Reading, and at the Hannah Dairy Research Institute, Ayr, are the editors. In the year 1936–37 subscriptions, sales of back volumes and of reprints of articles covered all costs and left a small surplus as shown in the accounts.

20. The British Commonwealth Scientific Conference considered that " Council had acted wisely " in coming to the assistance of this journal; but as the publication of papers on original research—for which in dairy science this journal chiefly exists—is no part of the ordinary duties of a bureau, it considered that, if governments accepted its recommendation to establish a bureau for dairy science, the responsibility of the Council for this journal should thereupon

cease. This cessation of official responsibility is not such a serious matter for the journal as it would have been had it happened in 1933. The journal is now, as the accounts show, almost, if not entirely, self supporting. These results are mainly due to the sustained and ungrudging voluntary work of the Editors, Dr. A. T. R. Mattick and Dr. Norman Wright.

D. *Imperial Institute of Entomology.*

Imperial Mycological Institute.

21. In paragraph 348 of its report the Imperial Committee on Economic Consultation and Co-operation recorded the fact that some governments had felt constrained to reduce or temporarily to withdraw their contributions to these Institutes and expressed the hope that these governments " will feel able to restore the contributions to their former basis." The progress made therein in each of the three succeeding years has been recorded in the reports of the Council for those years. In 1936–37 all contributions were paid at the rates prevailing before the depression.

(I) *Imperial Institute of Entomology.*

22. Attention has been drawn in the reports of previous years to the increasing demands on the Institute which, owing to the reductions in contributions, had become increasingly difficult to meet. The Fourth Imperial Entomological Conference of 1935 strongly recommended the re-establishment of an abstractor's post which had been retrenched at the time of the economic depression and the appointment of two additional specialists for identification work, the condition of which the Conference " viewed with concern." All these three posts were badly needed, but priority was given to that of the abstractor owing to the necessity of keeping abreast with current literature and to the fact that the output of entomological papers (as in fact in all sciences) had increased since the days before the depression and was increasing. The average annual number of papers abstracted in the journal in the years 1934 to 1936 was 16 per cent. greater than the average in the three pre-depression years 1927 to 1929; viz. 2,794 as compared with 2,410. With the restoration of contributions in 1935–36 this post of abstractor was filled, thereby bringing the strength of the staff on this side of the work back to what it was ten years previously.

23. The numbers of subscribers to both series of the abstracting journal—the Review of Applied Entomology, Series A, Agricultural, and Series B, Medical and Veterinary—were greater than in the previous year, when those numbers were higher than ever before. This has taken place in spite of an increase in the rate of the annual subscription in the previous year. The demand for back numbers also expanded. These facts can only mean that economic entomologists find the Review essential for their work.

24. The position as compared with that before the depression is as follows :

	Pre-Depression			1934	1935	1936
	1927	1928	1929			
Subscribers, Series A ..	445	482	491	565	571	588
Subscribers, Series B ..	362	405	406	430	436	447
Net receipts from sales	£507	£657	£881	£901	£1,283	£1,440

Rates of subscription were raised in 1929 and again in January 1935.

25. The 27th volume (1936) of the Bulletin of Entomological Research which is an illustrated quarterly journal containing original papers dealing generally with the more technical aspects of the subjects was notable for its very full collection of papers on locust problems. The number of subscribers (375) was somewhat higher than the average of the three pre-depression years (333), although the rate of subscription has been increased. Sales realised £820 as against an average in those years of £513.

26. As usual this branch of the Institute also issued the part of the Zoological Record dealing with Insecta which contained more titles (3,424) than ever previously. A book on the Biological control of an Insect in Fiji was also brought out and considerable progress was made in the preparation of the new " Nomenclator Zoologicus " for which the Zoological Society of London made a further contribution.

Altogether, the publication branch of the Institute had a very busy time and the reinstatement of the post of an abstractor was badly needed.

27. The increase of entomological work throughout the world affects the Institute not merely through the increase in the number of scientific papers to be examined and abstracted. It also adds considerably to the demands on the Institute for aid in identification.

Number of Specimens Received for Identification

Pre-depression years.		*Recent years.*	
1927–28	64,271	1933–34	80,733
1928–29	61,597	1934–35	101,728
1929–30	62,069	1935–36	116,783
Average of three years ..	62,646		99,748

It should not be imagined that all the specimens sent in differ. Necessarily there are and should be many duplicates, but there is no reason for

supposing that the average practice in this matter has changed between the two sets of years, yet the number of specimens received has increased by fifty per cent.

28. Whilst the Entomological Conference of 1935 gave, for the reasons stated, priority to the appointment of an abstractor the question of how to cope with these increasing demands for help in identification caused it " concern." In spite of the voluntary assistance of a large panel of specialists (73) arrears have accumulated and are accumulating. Another difficulty which is increasing is the inadequacy at present of the facilities for publishing the detailed descriptions of insects new to science.

29. In the year the Institute sent out 348 lists of identifications comprising 7,767 specific names. It also gave 39,200 named specimens to the British Museum of which 292 were new to science. The voluntary assistance of the specialists and especially of those at the British Museum was, as ever, very valuable and greatly appreciated.

The Laboratory for the Biological Control of Insect Pests—Farnham House

30. This Laboratory, which is an offshoot of the Imperial Institute of Entomology, was continued, as in the two previous years, on a year to year basis pending the consideration of its future at the British Commonwealth Scientific Conference. That Conference recommended its continuance and proposed finance for that purpose to cover five years from 1st April 1937.

31. The audited statement and the Director's report are attached. As regards shipments of beneficial insects the year was an extraordinary one. 182 shipments containing over 22 million beneficial insects were made to ten different countries (9 in the Empire and 1 foreign). This is clear from the following table :—

	No. of countries to which shipments are made.		No. of shipments.	No. of insects despatched.
	Empire	Foreign		millions
Six months Oct. 1933–March 1934..	4	2	45	0·8
Year 1934–35	6	2	166	5·3
1935–36	5	3	116	3·1
1936–37	9	1	182	22·3

The tremendous increase in the number despatched was due primarily to the discovery in Central Europe of exceptionally heavy infestations of Pine and Spruce sawflies, the beneficial parasites of which are required by Canada. Natural conditions account largely for the heaviness of those infestations but

their discovery and utilisation are due to the increased efficiency and experience of the trained staff at Farnham House. The quantity despatched, however, was so great, especially of the parasitised Pine Sawfly (*Diprion sertifer*) which takes some time to emerge, that at the request of the Canadian entomologists attention in the following year, 1937–38, has been given more particularly to other material.

32. Although the extremely large shipments to Canada (over 21½ millions) attract attention an equally important fact is the increase in the quantities despatched to other countries in the Empire and the greater use made by those countries of the Laboratory.

Number Despatched

	1934–35	1935–36	1936–37
	Figures in thousands		
United Kingdom	19·8	23·4	65·9
Australia	36·0	41·8	51·4
New Zealand	4·4	7·0	627·4
Union of South Africa	—	1·7	2·5
Ireland	0·7	—	1·0
India	—	—	5·0
Colonial Empire	0·5	—	13·3
	61·4	73·9	766·5

33. Contributions remained the same as in previous years viz. (£5,035) and the same system of charges—viz., reimbursement of special outgoings incurred of half the cost of the scientific assistant for the time he was engaged plus 5 per cent. on these (excluding travelling allowances)—remained in force. Without the assurance given by contributions it would be quite impossible to retain in existence a properly equipped laboratory with a trained staff. The charges are an attempt to ensure that those who use the laboratory most in any particular year also bear the greater share of the cost. Before the Council introduced this system of fees, no charges were made on the departments for these services, the cost of the laboratory being met from the Empire Marketing Fund. Some departments have thought that under this combined system of contributions plus fees they are being asked to pay twice for the one service. This is not so. A more correct way to regard it is to look on the contributions as in the nature of insurance payments, ensuring the existence of the Laboratory, that it will be there properly equipped and available when needed. When it is needed, it is likely to be needed urgently and seriously. Receipts from fees keep down the general level of these payments by way of contribution —thus contributions due for 1936–37 were £5,035 whilst net expenditure in

the year was £5,624 4*s*. 6*d*. Further the more work which is sent to Farnham House the greater the chance of a general reduction in contributions. Thus, those who send work to the Laboratory help everyone by increasing the chance of a reduction in fees; they also themselves receive the greater immediate benefit. A moment's consideration will show that the recovery of an assistant's full salary (still less recovery of only half) plus 5 per cent. thereon and on any particular extra expenditure incurred on the work (other than travelling allowances) go but a little way towards the full costs of the maintenance of a fully and properly equipped scientific institute and of the salary of an experienced and fully trained Director. So far from a country which makes use of the laboratory paying twice for the same work, once by way of contribution and once by way of fees, that country in fact receives direct value for its contribution, and it may well be direct value exceeding its annual contribution. At a bare 5 per cent. on an assistant's salary (still less on half) it would be impossible to provide him with the equipment, direction, library and facilities which Farnham House provides.

34. Recoveries through fees, charges for rent and for sales of parasite material realised £1,136 2*s*. 9*d*. in the year. Bills outstanding at the end of the year and since paid amounted to £417 9*s*. 8*d*. The balance to the credit of the laboratory on 31st March, 1937 was £1,850 10*s*. 5*d*. The earnings from fees during the three years, 1st April, 1934, to 31st March 1937 have met the growth of expenditure and accumulated this balance and good debts. The contributions and expenditure during those years have been as follows :—

	Contributions.	*Expenditure.*
	£	£ *s*. *d*.
1934–35	5,035	5,046 19 5
1935–36	5,035	5,237 9 11
1936–37	5,035	5,624 4 6
Total	£15,105	£15,908 13 10

Excess of expenditure over contributions £803 13*s*. 10*d*.

The growth in expenditure is due to restoration of economy cuts, operation of increments and replacement of worn out equipment.

Contributions have only been paid since 1st April 1934, although governments have been jointly responsible for the finance of the Laboratory since 1st October, 1933.

For the six months 1st October, 1933 to 31st March, 1934 His Majesty's Treasury in the United Kingdom advanced the net sums required to keep the Laboratory in being in that period, viz. £1,353 19*s*. 2*d*. The Council decided to discharge this debt out of the balances accumulated by the 31st March, 1937, and this has been done during the financial year 1937–38.

In the three years April, 1934, to March, 1937, the system of fees recommended by the Council has thus enabled this debt of £1,353 19*s*. 2*d*. to be discharged and a growth in expenditure of £803 13*s*. 10*d*. to be met without

seeking any increase in contributions from governments. These total £2,157 13*s.* 0*d.* which is over 14 per cent. of the total contributions (£15,105) in the three years. But for the fees, therefore, contributions would have had to have been 14 per cent. to 15 per cent. higher than they have been.

35. Whilst, however, the collection and shipment of beneficial parasites forms at present the chief work of the Laboratory, attracts the most attention and is inevitably the controlling consideration in matters of finance, it is not the sole—or in the long run even the most valuable—service which, in the opinion of many entomologists, the Laboratory endeavours and should be in a position to give. Biological control through the introduction of suitable parasites is a very specialised branch of economic entomology, calling not only for correct identification but for a very detailed record of the conditions under which a parasite thrives and of the range of its activities. No one imagines that one central laboratory should or could do that work for the whole world. In fact all economic entomologists wherever engaged on biological control are rightly occupied in that task. It is only from the general body of knowledge that will be accumulated through their efforts that the application of biological methods of control can be better understood and rendered more certain. In fact, in several countries, economic entomologists, quite understandingly, hesitate to try these methods through lack of very exhaustive information on the habits of the parasites which might be introduced. They hold that for the Laboratory to be of maximum service to all parts of the Empire, it should be in a position not only to examine and record from its side the fullest information about the parasites it is called upon to handle but should both be a centre for all information on biological control and be able to have that information readily available for any entomologists from contributing countries who apply to it for advice or assistance. The Laboratory within possible but narrow limits is attempting to do this, but it was conceived primarily and is at present chiefly organised for the collection and despatch of beneficial parasites which might be demanded and in which it could assist in procuring. This was the first and practical approach to a big and general problem. But the results of experience everywhere should be recorded and made available.

36. Dr. Thompson was invited to visit Canada and attend on 24th June, 1936, the opening of the Parasite Laboratory newly erected at Belleville, Ontario, which is the largest and best equipped laboratory in the world for the study of problems of biological control. This invitation to Dr. Thompson was both very opportune and welcome. In the last few years most of the work at Farnham House has been undertaken on behalf of Canada and an opportunity to discuss that work, to see the manner in which the material arrived and was handled, and also to meet entomologists specialising in biological control, was most useful.

Dr. K. R. S. Morris who for the previous few years had been directly in charge of the work in Central Europe on behalf of Canada, and to whose energy,

resource and knowledge the very large shipments, which have been recorded in this and earlier reports are directly due, resigned his appointment at the Laboratory with effect from the 31st March, 1937, having accepted an appointment in the service of the Gold Coast Colony. The Executive Council greatly appreciates the services he rendered whilst in their employ.

II. *Imperial Mycological Institute.*

37. This Institute had suffered relatively more than that of Entomology by the withholding or reductions by certain governments of their contributions, and a very few years ago its financial position had become precarious, although work continued to increase. The complete restoration of contributions referred to in paragraph 21 was therefore very welcome.

The Institute was especially fortunate in the year as Dr. G. R. Bisby, D.Sc., joined its staff on the completion of his Canadian service, where he had been Professor of Plant Pathology at the University of Manitoba. He has always been interested in the work of the Institute and was desirous of aiding it. His presence at the Institute has greatly strengthened its ability and authority in matters of identification, especially on those relating to soil fungi. Mycologists generally will benefit from his knowledge and experience.

38. The work of this Institute falls into three sections (i) investigation, (ii) identification, and (iii) the collection and dissemination of information.

Investigation is a necessary preliminary to identification in very many of the more obscure genera and species. Previous reports have shewn the need for this work, and have given many instances in which in regard to these obscure species of phytopathological importance confusion in nomenclature and description has only been cleared after close scientific investigation. Dr. Wiltshire, in addition to editing the Review, was engaged in studies of *Sporidesmium*—a genus of a very doubtful standing which has clearly been used to cover a mixed group of species. Material received from Southern Rhodesia and also from India has proved of great assistance. Dr. Bisby has worked on a more correct method of classifying the *Fungi Imperfecti* with a special view to the needs of applied mycology. Mr. Dade also found opportunity to take up once more investigational work on which he had previously begun.

39. This investigational work directly assists the identification work in which the aid of the Institute is sought. The demands on the Institute for this type of help increase. The Director's report (*vide* Appendix III) mentions in illustration specimens or cultures either identified or received for identification from Great Britain, Canada, Australia, New Zealand, India, Southern Rhodesia, Ceylon, Malaya, Sierra Leone, Cyprus, the Solomon Islands, Trinidad and the Anglo-Egyptian Sudan. In the same report the Director mentions certain of the specimens or cultures which possessed considerable economic or scientific interest.

40. This assistance in identification, which is given by a central institution organised co-operatively as is the Imperial Mycological Institute, is not merely a personal service rendered to the particular enquirer who has sought its aid. It has a much wider result than that. It directly helps mycologists everywhere. Without such a central institute to aid with obscure difficulties and to help to keep identification uniform it is hard to see how in any reasonable time the Lists of the Fungi in many parts of the Empire could be compiled. Yet these lists with their descriptions are of great use to mycologists everywhere. During the year a complete revised list of diseases on economic plants in Tanganyika Territory was published in the East African Agricultural Journal, as also a similar revised list for Kenya and the publication of one for Uganda was begun. During the year lists of diseases of cultivated plants in Ceylon and in Sierra Leone were also issued; and those for Cyprus and the Gold Coast were either in the Press or nearly ready for printing.

41. Mycological literature throughout the world continues to increase in volume. The number of papers to be scrutinized in preparing the Journal of Applied Mycology has increased and is increasing. The number of abstracts published has consequently increased. The journal maintained its position as authoritative and its reputation for being up to date. The number of subscribers at 592 was a little higher than in any previous year. Owing to this and to sales of back numbers receipts from sales at £698 were substantially higher. In every branch of the Institute's work the year was one of increased activity and increased output.

E. *Research Schemes.*

I. *Low Temperature Research.*

II. *Wool Research—Torridon.*

III. *Stored Products Research Laboratory—Slough.*

42. Except that the Southern Rhodesian contribution was reduced from £500 to £250, the same arrangements were continued as regards the first two of these schemes as in the previous years, pending their consideration at the British Commonwealth Scientific Conference.

The Low Temperature Research work is administered by the Department of Scientific and Industrial Research, the general programme of research being drawn up and carried out on the advice of the Food Investigation Board. A very brief summary of the objectives of this work of the results achieved and of the lines of further research being developed was given in the previous year's report (para. 58). A full account of the work in the year 1936–37 is given in the Report of the Department for that year.

43. The delegates to the Conference visited the research stations engaged on Low Temperature Research at Cambridge, Ditton (near East Malling) and

Torry (near Aberdeen) and the Headquarters and local staffs engaged on the work. The Conference (paragraphs 106–110 of its report) again drew attention to the wide economic significance of this work, to the commercial results already obtained and to " the necessity, in the interests of producers and consumers alike, for research on both the fundamental and applied aspects of the problem being undertaken or continued in the Dominions and Colonies as well as in the United Kingdom." The Conference noted further that in this important research work collaboration between different parts of the British Commonwealth " is both effective and growing." It reviewed the arrangements for the circulation of information and suggested improvements As regards the contributions which had been made through the Council it was " of opinion that they should be, as at present, a matter for arrangement between the individual governments concerned, to be dealt with as heretofore and that it is undesirable to formulate any general principles concerning them."

44. Wool is so commercially important to several portions of the British Commonwealth that research into its properties and further possible utilization is of special interest. When the Conference was considering this subject it was aware that proposals were far advanced for a special conference " to consider the possibilities of organising a co-operative scheme which would cover research on utilization of wool, including particularly the study of the extension of its use." It therefore refrained from making specific recommendations beyond urging that " the governments concerned should encourage the holding of that special Conference " and recommended the continuation of the present grants through Council " as an interim measure pending further examination (presumably in the light of the results of that Conference) and provided it is not too long delayed " (paras. 115 to 120 of the report).

45. A special Conference fully representative of the Southern Dominions was held in Australia in December, 1936. As a result of that Conference schemes were devised and accepted by the countries interested whereby largely increased funds would be made available for research into the questions connected with the production of wool, into questions affecting both production and utilization and for publicity to encourage the increased use of wool. The funds so to be provided were to be under the control of a co-operative body styled " The International Wool Research and Publicity Secretariat." This organization came into being in 1937–38 and consequently in that year fell the further examination of the position recommended by the Scientific Conference. Meanwhile governments have continued the contribution totalling £2,000 to the Wool Research Institute, Torridon which on its side has continued the research work which it was fitted to conduct and had started on certain problems of special interest to producers.

46. The circumstances under which contributions had been made through Council to the work conducted at the Stored Products Research Laboratory,

Slough have been explained in previous reports. In that for 1935–36 the Council stated that "this aid coupled with that generously provided by the Trustees of the Carnegie Corporation of New York saved the Laboratory with the two fold result that the scientific quality of the research work has had time to be more fully recognised and opportunity has occurred to demonstrate the practical efficiency of methods dependent on that research work." By the time that the Scientific Conference met in September, 1936, the fundamental research work conducted at the Laboratory had been recognised as one of the regular activities of the Imperial College of Science and Technology to be financed through that organization. In accordance with the recommendations made by Council in the previous year no contributions were made in 1936–37 by governments through Council. The results of this fundamental research work is of direct importance to all parts of the Empire. It is satisfactory that long term arrangements have now been made for its continuance, it being understood that individual governments will bear the full costs of any special work or applications they wish done.

47. On each of these research schemes—the Laboratory at Farnham House, Low Temperature Research and the Stored Products Research Laboratory at Slough—contributions had been made by governments through Council with effect only from 1st April, 1934, although under paragraph 351 of the report of the Imperial Committee on Economic Consultation and Co-operation liability dated from the 1st October, 1933. In each case the funds needed for the six months October, 1933 to March, 1934, had been advanced by His Majesty's Treasury in the United Kingdom. The sums in question were :—

	£	s.	d.
Farnham House	1,353	19	2
Low Temperature Research	4,900	0	0
Stored Products, Slough	900	11	9

The manner in which the debt on Farnham House has been discharged has been given in paragraph 34. In the case of the other two schemes there were and could be no receipts from which to meet the debts. Governments were asked to provide the sums needed in the same proportion in each case as contributions were made in 1934–35.

By 31st March, 1937, the only sums outstanding for this purpose were :—

	Low Temperature.	*Stored Products, Slough.*		
	£	£	s.	d.
New Zealand	1,500	31	5	9
Union of South Africa ..	850	—		

The sum of £850 from the Union of South Africa was provided in the estimates for 1937–38 and paid in July, 1937.

F. *General.*

48. The year was generally one of great activity in all the institutes and bureaux. The work at each centre was examined by the British Commonwealth Scientific Conference. The amount of literature coming into every institute and bureau for examination increased. As a consequence the journals almost without exception increased in size. The number of subscribers increased. Receipts from sales were higher than ever previously. The number of beneficial parasites despatched from Farnham House reached extraordinary figures. The number of specimens sent for identification to the two institutes also increased. Towards the end of the year arrangements were made to fit out a potato expedition to the Andes whch had to be postponed. All this is evidence of increased use of these organizations by those for whose assistance they have been created. Some of the most important recommendations of the Conference were designed to ensure that still further use is made of them.

49. Receipts by the institutes and bureaux from sales of publications, after deductions of booksellers' commission where that is payable, and net recoveries made by Farnham House are very nearly £9,700, whilst the sale value of the publications distributed free to Empire countries exceeds £3,100. These are substantial figures, whether considered separately or jointly. The public interested in the publications of each bureau or institute is necessarily very specialised and consequently limited. Yet the cash receipts at £9,700 which go towards the cost of maintaining these organizations exceed 20 per cent. of the total contributions by governments.

The total was made up as follows :—

	£	s.	d.
Receipts from Sales after deducting booksellers' commission at the bureaux	4,714	1	8
the Imperial Institute of Entomology	2,524	8	1
the Imperial Mycological Institute	698	11	3
for Journal of Dairy Research	626	9	9
Net Recoveries towards the cost of Farnham House by the shipments of parasites and material	1,129	3	3
Total	£9,692	14	0

G. *The Journal of Dairy Research.*

With the formation of a bureau for dairy science the Council will no longer be responsible for the administration of the Journal of Dairy Research, though it will always retain interest in its future.

NEVILL L. WRIGHT,
Chairman.

EXECUTIVE COUNCIL, IMPERIAL AGRICULTURAL BUREAUX.

Account of Receipts and Payments for the Year ended 31st March, 1937.

Receipts.

	£	s.	d.
Balance at 1st April, 1936	1,300	5	9
Contributions from Governments of the Empire to Imperial Agricultural Bureaux	21,926	13	9
Journal of Dairy Research	34	1	9
Potato Expedition to South America:			
Contributions £300 – –			
Less expenditure 104 9 6			
	195	10	6
Dividends and Interest	680	4	–
Miscellaneous Receipts	4	6	–
Post Office Savings Bank (net withdrawal)	5,805	18	6
	£29,947	–	3

Payments.

	Gross Expenditure.			*Less* Receipts from Sales of Publications, etc.			Net Expenditure.					
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Expenditure Incurred by Imperial Bureau of:—												
Soil Science (Rothamsted)	2,699	18	7	275	14	–	2,424	4	7			
Animal Nutrition (Aberdeen)	3,231	–	5	11	13	4	3,219	7	1			
Animal Health (Weybridge)	5,491	13	9	1,372	14	10	4,118	18	11			
Animal Genetics (Edinburgh)	1,951	–	10	156	–	11	1,794	19	11			
Fruit Production (East Malling)	2,363	11	1	151	11	4	2,211	19	9			
Plant Genetics (Herbage) (Aberystwyth)	3,147	19	8	217	–	3	2,930	19	5			
Plant Genetics (Non-Herbage) (Cambridge)	3,275	6	7	268	3	8	3,007	2	11			
Agricultural Parasitology (St. Albans)	1,668	8	–	294	16	1	1,373	11	11			
Secretariat Expenses	2,817	4	5	46	7	3	2,770	17	2			
										23,852	1	8
Contributions from Governments of the Empire to various Institutes paid over							24,233	11	1			
Less received during year of Account							24,178	9	10			
										55	1	3
Contributions (1933/34) Reserve Account Payment of sums advanced for the period 1st October, 1933 to 31st March, 1934										3,802	10	11
Losses										6	17	8
Balance on the 31st March, 1937:												
His Majesty's Paymaster-General							2,013	11	6			
Balances in hands of Directors							636	9	8			
Balance in hands of Dr. P. S. Hudson (on A/c Potato Expedition to South America)							100	–	–			
							2,750	1	2			
Less outstanding orders							582	7	7			
							2,167	13	7			
Add Suspense Accounts							62	15	2			
										2,230	8	9
										£29,947	–	3
Investments at 31st March, 1937:												
£4,000 5% Conversion Loan 1944/64 at cost							4,152	16	–			
£2,000 3½% South Australia Stock 1939 at cost							1,940	4	–			
£2,000 4% Natal Stock 1937 at cost							2,070	4	–			
£4,000 3% Commonwealth of Australia Registered Stock 1939/41 at cost							3,959	14	6			
Post Office Savings Bank							1,707	10	2			

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.
20th August, 1937.

(*Signed*) W. G. IVES,
Accountant.

(*Signed*) DAVID CHADWICK,
Secretary.

IMPERIAL INSTITUTE OF ENTOMOLOGY.

ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1937.

Receipts.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1936 :—						
Joint Colonial Fund	4,000	–	–			
Crown Agents for the Colonies ..	352	2	3			
H.M. Stationery Office	200	–	–			
	4,552	2	3			
Less :—						
Due to Sir G. Marshall .. £12 7 11						
Widows' and Orphans' Insurance. Employees' contributions 6 4						
Suspense 1 6						
	12	15	9			
				4,539	6	6
Contributions from Empire Governments ..	12,517	–	–			
Contributions from Foreign Governments ..	475	10	5			
Contributions from Societies	200	–	–			
				13,192	10	5
Interest and Dividends				476	10	10
Sales of Publications				2,524	8	1
				£20,732	15	10

Payments.

	£	s.	d.	£	s.	d.
Salaries, Director, etc.				2,400	–	–
F.S.S.U. contributions				240	–	–
Salaries, Scientific staff				6,183	14	1
F.S.S.U. contributions				554	2	6
Salaries, whole time staff				2,369	2	–
F.S.S.U. contributions				203	5	–
Provident Fund contributions				17	1	2
Salaries, part time staff				96	13	8
National Insurance				14	14	9
Travelling expenses				9	4	
Books, Publications				141	6	8
Bulletins				2,148	5	7
Stationery, Postages, Telephones				122	10	10
Rent, Rates, Insurance				348	8	4
Light, Heat, Water, Cleaning, Housekeeping				331	11	2
Laboratory Equipment				7	13	–
Contingencies				22	3	9
Furniture				25	14	8
Redecoration				–	–	–
Locust Research				104	–	–
Audit Fee				25	–	–
				15,355	16	6
Balance on 31st March, 1937 :—						
Joint Colonial Fund	5,000	–	–			
Crown Agents for the Colonies ..	99	11	9			
H.M. Stationery Office	200	–	–			
Sir G. Marshall	7	7	10			
F.S.S.U. Suspense	70	19	3			
	5,377	18	10			
Less Widows' and Orphans' Insurance, Employees' contributions	19	6				
				5,376	19	4
				£20,732	15	10

		£	s.	d.
Investments at 31st March, 1937:				
£1,000 – –	Cyprus 1956/66 Stock 4% at cost ..	950	–	–
£2,679 19 –	Funding 1960/90 Stock 4% at cost	1,869	12	6
£1,000 – –	Jamaica 1952/62 Stock 4% at cost	940	–	–
£1,017 16 8	Kenya 1961/71 Stock 4½% at cost ..	998	15	–
£1,000 – –	India 1950/55 Stock 4½% at cost ..	936	7	–
£1,000 – –	Nigeria 1963 Stock 4% at cost ..	881	7	–
£1,000 – –	Natal 1937 Stock 4% at cost	943	16	6
£8,697 15 8		£7,519	18	–

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

(*Countersigned*) B. C. G. PERRY, *for Accountant to Council.*
(*Signed*) DAVID CHADWICK, *Secretary.*
(*Signed*) GUY A. K. MARSHALL, *Director.*
21*st July*. 1937.

IMPERIAL MYCOLOGICAL INSTITUTE, FERRY LANE, KEW, SURREY.

Account of Receipts and Payments for the Year ended 31st March, 1937.

Receipts.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1936:						
Joint Colonial Fund	1,500	–	–			
Crown Agents	101	18	10			
Bank	36	13	3			
Cash		17	7			
Stamps	5	19	5			
F.S.S.U. Suspense Account	24	11	3			
				£1,670	–	4
Contributions				7,482	14	–
Interest				131	13	7
Publications				698	11	3
				£9,982	19	2

Payments.

	£	s.	d.	£	s.	d.
Director's salary				1,120	16	8
Superannuation				147	10	–
Scient. and Tech. Staff Salaries				3,595	18	10
Superannuation				373	–	–
Clerical Staff Salaries				619	6	10
Superannuation				34	12	–
Laboratory Attendant				183	11	8
Superannuation				17	10	–
Overtime, etc.				22	6	6
National Insurance				13	17	4
Travelling				3	11	–
Purchase of books				50	5	10
Issue of Periodicals				901	19	–
Stationery, post, telephone, etc.				86	18	10
Rent, rates, insurance				103	17	4
Light, heat, water, cleaning, etc.				174	14	1
Laboratory apparatus				66	11	8
Furniture				2	19	7
Binding, etc.				130	1	–
Audit				20	–	–
				£7,669	8	2
Balance on 31st March, 1937:						
Joint Colonial Fund	2,000	–	–			
Crown Agents	173	11	4			
Bank	87	3	4			
Cash		1	7			
Stamps	2	6	10			
F.S.S.U. Suspense Account	50	7	11			
				2,313	11	–
				£9,982	19	2

Investments on 31st March, 1937:
New Zealand 4½% 1944 £2,077 15*s.* 4*d.* at cost £2,000

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct.

(*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

23*rd June*, 1937.

(*Countersigned*) B. C. G. PERRY, *for Accountant to Council.*

(*Signed*) S. F. ASHBY, *Director.*

(*Signed*) DAVID CHADWICK, *Secretary.*
Executive Council, Imperial Agricultural Bureaux,
3*rd May*, 1937.

IMPERIAL INSTITUTE OF ENTOMOLOGY, PARASITE LABORATORY, FARNHAM HOUSE.

ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1937.

Receipts.	£	s.	d.	£	s.	d.
Balance on 1st April, 1936 .. .. (Includes £41 13*s.* 4*d.* balance of grant from Agricultural Research Council).				1,329	4	8
Contributions from Governments of the Empire				5,009	7	6
Contributions towards work on Special Projects	4,349	9	1			
Less Expenditure thereon	3,324	14	7			
				1,024	14	6
Accommodation of Australian Entomologists				100	0	0
Miscellaneous Receipts:						
Sales of parasite material	4	8	9			
Interest	5	12	0			
Sundries	1	7	6			
				11	8	3
Proceeds arising from Sale of Land to Buckinghamshire County Council ..	271	18	1			
Less Fees in connection therewith ..	21	–	–			
	250	18	1			
Interest on Deposit of Proceeds	2	10	9			
				253	8	10

Payments.	£	s.	d.	£	s.	d.
Directional Staff:						
Director	200	–	–			
Superintendent and Assistant Director	1,200	–	–			
Superannuation	138	11	8			
Provident Fund	5	16	8			
				1,544	8	4
Scientific and Technical:						
Assistant Entomologists	1,441	5	–			
Field Officer	340	9	8			
Superannuation	180	10	–			
Provident Fund	7	2	11			
				1,969	7	7
Secretary, etc.				317	16	7
Laboratory Stewards				220	17	11
Caretaker and Gardener				313	6	0
Superannuation				47	18	0
Provident Fund				1	18	10
National Insurance				14	7	7
House Maintenance				86	7	9
Laboratory Maintenance				335	15	9
Rates				82	–	1
Fuel				63	–	8
Electric Current				156	17	7
Fire and other insurances				16	7	11
Motor and Petrol Gas Plant				42	8	11
Travelling				86	18	7
Shipments and Postal Services				110	13	4
Garden				105	17	1
Library				56	2	8
Audit Fee				10	–	–
Research	104	3	4			
Less Grant from Agricultural Research Council	62	10	–			
				41	13	4
				5,624	4	6

	General A/c.			Capital A/c.			
Balance on 31st March, 1937:	£	s.	d.	£	s.	d.	
Crown Agents for the Colonies	770	18	8				
Joint Colonial Fund ..	1,000	–	–	200	–	–	
Deposit with Bank				53	8	10	
Superintendent, etc.	63	18	10				
F.S.S.U. ..	15	12	11				
	£1,850	10	5	£253	8	10	2,103 19 3
							£7,728 3 9

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

11*th August*, 1937.

(*Signed*) W. R. THOMPSON, *Superintendent.*

(*Signed*) DAVID CHADWICK, *Secretary.*
Executive Council, Imperial Agricultural Bureaux.

(*Signed*) W. G. IVES, *Accountant to Council.*

APPENDIX I

BRITISH COMMONWEALTH SCIENTIFIC CONFERENCE LONDON 1936.

Extract from Report of Proceedings.

PART II.—SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

(This summary should be read in conjunction with the appropriate paragraphs in the Detailed Report which follows.)

25.—(i) The organization and direction of the bureaux and institutes administered by the Executive Council of the Imperial Agricultural Bureaux accord with the principles laid down in the Report of the Imperial Committee on Economic Consultation and Co-operation and approved by governments. The work and usefulness of these organizations are satisfactory and they afford an example of effective co-operation on a true intra-Imperial basis. (Para. 26.)

(ii) Contact between individual bureaux and institutes on the one hand and Commonwealth research workers on the other would be improved by the appointment by each contributing Government of one or more liaison officers (in addition to the present scientific correspondents) to cover the field embraced by all the bureaux and institutes. It would be the duty of such liaison officers to foster greater co-operation between the bureaux and institutes and the research workers in their own countries. (Paras. 27 and 28.)

(iii) The Executive Council is asked to examine carefully the question of the distribution of bureau publications, particularly the possibility of increasing revenue from this source by raising prices, reducing the free list, and charging higher prices to subscribers from non-contributing countries. Proposals are made regarding the number of copies which each contributing area should receive in return for its contribution to the cost of the bureaux. (Paras. 32 and 33.)

(iv) It is recommended that further steps should be taken, both by the Executive Council and the bureaux, to make known the services which the bureaux are able to render. Attention is drawn to the desirability that research workers generally should possess, as part of their normal equipment, the bureau journals covering their respective field. (Paras. 34 and 40.)

(v) Charges should be made by the bureaux for translations made by them of papers not of general interest. (Para. 35.)

(vi) The practice of holding regular meetings of directors and of deputy directors is commended. (Para. 38.)

(vii) Every encouragement should be given by governments to methods by which adequate personal liaison may be established between the bureaux and Commonwealth research workers. (Para. 39.)

(viii) The List of Agricultural Research Workers in the British Empire, published annually by the Executive Council, should be revised, so that the List is strictly limited to those who are engaged in research, or actively concerned with its organization; further, a brief indication of the special line of study of each research worker should be given. (Paras. 43 to 45.)

(ix) The Conference re-affirms the principle that a bureau may be established in any part of the Commonwealth, or transferred from one part to another, and suggests that the application of this principle should be considered by the Executive Council from time to time, and should be raised at the next Conference. (Paras. 46 and 47.)

(x) *Bureau of Soil Science.*—(*a*) In view of the increasing importance of soil science to forestry closer contact between the bureau and forestry officers merits consideration. (Para. 49.)

(*b*) In collaboration with other bureaux, including those dealing with Animal Health, Fruit Production and Plant Genetics (Herbage Plants) the Bureau of Soil Science could with advantage issue, at intervals, a special supplement containing extended titles of papers of interest to agricultural meteorologists, particularly papers dealing with the relationship between biological activities and weather influences. (Para. 55.)

(xi) *Bureau of Animal Nutrition.*—Appropriate steps should be taken to extend the circulation of " Nutrition Abstracts " among scientists interested in both human and animal nutrition. (Para. 56.)

(xii) *Bureaux of Plant Genetics* (*for Crops other than Herbage*) *and Plant Genetics* (*Herbage Plants*).—(*a*) Some re-arrangement of the duties of these two bureaux is recommended, the former (Cambridge) to be responsible for abstracting genetical research papers on all crops, and the latter (Aberystwyth) to deal with genetics only in special circumstances, devoting more general attention to pastures and to forage crops as referred to hereunder. The title of the former bureau should be altered to " The Imperial Bureau of Plant Breeding and Genetics " and of the latter to " The Imperial Bureau of Pastures and Forage Crops." (Para. 58.)

(*b*) Subject to the foregoing the Aberystwyth bureau should deal with pastures and forage crops together with important papers on plant physiology as applied to these crops. The two bureaux should continue to pay attention jointly to the important subject of vernalization. (Paras. 59 and 60.)

(xiii) *Bureau of Fruit Production.*—An extension of the abstracting work to cover more fully vegetables and glasshouse crops is desirable, and should be adopted so far as financial arrangements permit. The title should be altered to " The Imperial Bureau of Horticulture and Plantation Crops." (Para. 61.)

(xiv) *Bureau of Animal Genetics.*—The Executive Council should endeavour to arrange for the appointment of a deputy director at the earliest practicable date. The title of the bureau should be altered to " The Imperial Bureau of Animal Breeding and Genetics." (Paras. 62 and 63.)

(xv) *Bureau of Agricultural Parasitology.*—This bureau deals with Helminthology and for the present it is not considered desirable to include protozoology within its scope. The title should be altered to " The Imperial Bureau of Agricultural Parasitology (Helminthology)." (Para. 64.)

(xvi) *Finance of the eight existing bureaux.*—The Conference recommends that over the five year period commencing 1st April, 1937, the contributing Governments should continue to provide for the eight existing bureaux a sum of £21,800 annually, divided between them in the proportions agreed for the annual sum of £20,000 under the original scheme, framed in pursuance of the recommendations of the 1927 Conference. In order to meet existing commitments and the increasing demand on the bureaux's services a further sum of £6,000 spread over the quinquennium, and shared in the same proportions, should also be contributed. Should it prove impracticable to assemble before the autumn of 1941 a further Conference to examine and review the work of the Council and of the bureaux, then the steps suggested in paragraph (xxxi) of this summary should be taken by the Executive Council. (Paras. 65 to 69.)

(xvii) *Imperial Institute of Entomology.*—The Executive Council should examine further the practicability of the division of the Institute's services into (i) bureau and (ii) other activities and of introducing a system of payment for identification services rendered by the Institute. (Paras. 73 and 74.)

(xviii) The Executive Council should examine the possibility of increasing revenue by raising the prices of the Institute's publications, with suitable discounts to subscribers from contributing countries, and of reducing the free list. A revised basis for the distribution of free issues is suggested. (Para. 75.)

(xix) The advantage of extending the Institute's work in directions recommended by the Entomological Conference 1935 is emphasized, and possibilities of securing this end are referred to in detail below, additional contributions of £750 a year being contemplated for this purpose. (Para. 76.)

(xx) *Farnham House Laboratory.*—The Laboratory should be continued on an intra-Imperial basis, a sufficient sum being contributed by governments to provide for the maintenance of headquarters and equipment and the retention of a nucleus staff. Proposals are made for the distribution of this sum between governments. (Para. 86.)

(xxi) It is recommended that charges be made for all work carried out by the Laboratory in response to requests. In the case of special projects, the basis of charge should be :—

(*a*) all travelling and subsistence expenses;

(*b*) the full salaries of officers for the time they are employed on such projects;

(*c*) incidental out-of-pocket expenses; and

(*d*) five per cent. on the sum of (*b*) and (*c*) towards overhead expenses.

For other services charges should be determined by the Executive Council. Contributions by governments for headquarters and nucleus staff should be reduced in future years provided the Executive Council are satisfied that the surplus that may have accrued, by reason of receipts from the charges made, justifies such reduction. (Paras. 83, 84.)

(xxii) *Imperial Mycological Institute.*—In regard to the Institute's publications, proposals are made on similar lines to those suggested for the Imperial Institute of Entomology. (Para. 88.)

(xxiii) The Institute's financial position and urgent additional needs during the next five years would be safeguarded if certain increases in annual contributions by governments materialise, amounting to £600 a year. (Para. 89.)

(xxiv) *New Bureau of Dairy Science.*—The Conference recommends the formation, as a part of the general bureau service under the Executive Council, of an Imperial Bureau of Dairy Science at a cost of £1,800 a year for five years beginning 1st April, 1937, that sum to be divided among governments in the proportions accepted for the division of the £20,000 per annum originally provided for the existing bureaux. Subject to the consent of the Governing Body of the National Institute for Research in Dairying, Shinfield, near Reading, it is recommended that the new Bureau be placed at that Institute. (Para. 96.)

(xxv) From the year in which an Imperial Bureau for Dairy Science is established the deficiency grant now made by the Executive Council to the Journal of Dairy Research should cease; until then the grant might be continued, but if for any reason the establishment of the Bureau of Dairy Science is deferred, the amount of the grant should be progressively reduced with a view to early extinction. (Para. 98.)

(xxvi) *New Bureau of Forestry.*—The Conference submits for the favourable consideration of governments a proposal for the establishment of an Imperial Forestry Bureau on lines similar to the agricultural bureaux, and with its organization and control entrusted to the Executive Council. It is considered that a sum of £3,000 a year for the first five years will be sufficient for this bureau, in the form of contributions from governments in the same proportions as the contributions to the existing bureaux. An indication is given of the field of work which it could conveniently cover and the question of the particular Institute within the Commonwealth at which the bureau, if approved, should be located should be examined by the Executive Council. (Para. 105.)

(xxvii) *Research on the Transport and Storage of Foodstuffs.*—The Conference emphasises the necessity for research on both the fundamental and applied aspects of transport and storage problems being undertaken or continued in the Dominions and Colonies as well as in the United Kingdom. The real need for an information service by which research workers may be kept advised of the large and growing scientific literature related to these problems is recognized, and the Conference records the fact that this matter is under consideration by the Department of

Scientific and Industrial Research in the United Kingdom, which already issues an " Index to the Literature on Food Investigation," which partly meets the need. (Para. 110*a* and 110*b*.)

(xxviii) The Conference considers that the contributions of certain overseas countries towards the expenditure of the Food Investigation Board of the United Kingdom should continue to be a matter for arrangement between the individual governments concerned and dealt with as heretofore, and that it is undesirable to formulate general principles concerning them. (Para. 110*c*.)

(xxix) *Control of Insect Infestation of Stored Products.*—The Conference appreciates the valuable work carried out at the Stored Products Research Laboratory of the Imperial College of Science and Technology at Slough, and expresses the hope that although the work is no longer supported by financial contributions through the Executive Council, the Director will keep the Executive Council informed of the activities of the Laboratory through publications, and if feasible by communicating from time to time his programme of work. (Para. 114.)

(xxx) *Wool Research.*—The Conference considered the future of the contributions, totalling £2,000 per annum, now being made through the Executive Council to the Wool Industries Research Association, and also a memorandum (so far as it related to research) presented by New Zealand outlining extensive proposals for further work in aid of wool interests. It recommends :—

(*a*) that governments concerned should encourage the holding of a special conference to consider the possibilities of organizing a co-operative scheme which would cover research on utilization of wool and the extension of its use;

(*b*) that governments be invited to consider favourably the possibility of continuing as an interim measure, pending further examination, the payments which they are at present making through the Executive Council for work done by the Wool Industries Research Association. (Para. 120.)

(xxxi) *Periodical Examination of Council activities by Conferences.*—The Imperial Committee on Economic Consultation and Co-operation recommended that the activities of intra-Imperial agencies should be reviewed periodically by conferences suitable for the purpose, which should also consider what financial provision would be adequate for a period of succeeding years. The Conference recommends that the Governments of the British Commonwealth be requested to arrange for the assembly of a conference similar to the present one between July and September, 1941, and that that conference should be charged—

(*a*) to review and examine all activities associated with the Executive Council;

(*b*) to consider and make recommendations concerning the financial provision required for the ensuing five year period for whatever activities may be entrusted to the Council;

(*c*) to consider such resolutions passed at specialist conferences held in the meantime as may have been referred to the Council; and

(*d*) to consider such subjects as may have been previously agreed upon by governments.

Further, the conference recommends that should it prove impracticable to assemble within the period suggested a conference for the consideration of the financial questions referred to in (*b*) above, the Executive Council should bring the matter to the notice of governments in due time, in the expectation that the contributions to the various activities of the Council will be continued at the existing rates, pending consideration by such conference. (Para. 122.)

(xxxii) *Feasibility and Advisability of* (a) *Periodical Specialist Conferences,* (b) *of a General Commonwealth Conference on Agriculture, and* (c) *of a General Scientific Conference.*—The Conference considers that, for various administrative reasons, it is not practicable at present to convene either a general Commonwealth Scientific Conference or one covering the whole field of the science of agriculture.

It recognizes the value of specialist conferences—that is conferences each dealing with a special science or with a special subject which may concern one or more scientific departments—but considers that the agenda for such conferences should be restricted to scientific subjects and to technical administrative matters related thereto.

In arranging specialist conferences, the dates of meetings of cognate international conferences could with advantage be kept in view, and also the possibility of co-ordinating the dates of separate specialist conferences where closely allied sciences are concerned. (Para. 126.)

(xxxiii) *Proposal for an organization to ensure fuller co-operation in scientific research.*—In the discussion on this proposal a distinction was drawn between the furtherance of voluntary collaboration in scientific research and the particular method suggested in this proposal as one possible means of securing it. The organization proposed presented constitutional and practical difficulties. The Conference, moreover, noted that it is within the competence of the Executive Council, within the limits of its constitution, to submit to governments from time to time proposals for co-operative action in regard to scientific research. In these circumstances the Conference decided to take note of this paper. (Para. 129.)

(xxxiv) *Co-operation in obtaining and maintaining plant material for crop improvement.*—It would be an advantage if, when a country is planning an exploratory expedition to obtain new plants or species, it would send full particulars to the Executive Council, so that other countries within the British Commonwealth could be informed and given an opportunity of sharing therein, if they wished. The Conference considers that the work of plant improvement would be assisted, and the exchange of material facilitated, were Plant Breeding Stations to maintain detailed descriptive lists of the material they have, and to send such lists to the appropriate bureau for the information of other countries. The Conference accordingly remits these two questions to the Executive Council for further consideration. (Paras. 131 to 133.)

(xxxv) *Interchange of research workers, of information and of programmes.*—The exchange of officers, one for one, between institutions in different countries of the Commonwealth is rarely practicable. The Conference attaches, however, great importance to visits of research workers to institutes in other countries, and to fuller exchange of programmes of work. As a particular instance it welcomes the offer by the Department of Scientific and Industrial Research (United Kingdom) to receive at its Building Research Station and at the Road Research Laboratory Officers from overseas governments to enable them to obtain experience of the technique and methods developed at these Stations for the study of building and road problems. (Para. 140.)

(xxxvi) *Investigation into control of damage by termites.*—In view of the economic importance of this problem, and of the work that is being done upon it in many parts of the British Commonwealth, the Conference commends to governments the desirability of arranging for fuller interchange of information on all aspects of this problem, and recommends that the Executive Council should be requested to arrange for the dissemination of that information classified according to the several aspects of the problem. (Para. 147.)

(xxxvii) *Uniformity of health certificates accompanying exports of living plants.*—The Conference notes the valuable progress which has been made in securing agreement within the Commonwealth to the model form of health certificate to accompany exports of living plants, and recommends that those governments which have not yet intimated their views, or which have so far been unable to accept the model form completely, might be invited to consider or reconsider the possibility of doing so. (Para. 152.)

(xxxviii) *Research work towards the standardization of methods for testing the efficacy of fungicides and insecticides.*—The Conference draws attention to the need in the various parts of the Commonwealth for fundamental research into methods for the biological standardization of fungicides and insecticides, and considers that it would be of material assistance to those already engaged on that work if the Executive Council could collect programmes of work, preliminary results and reports, and circulate them for the information of research organizations. (Para. 154.)

APPENDIX II

IMPERIAL INSTITUTE OF ENTOMOLOGY REPORT FOR 1936-37

In March, 1937, this Institute completed the 24th year of its existence, and naturally by now its work has become largely standardised; but this must not be taken to imply that the work is also stabilised. On the contrary, the pressure on our staff slowly but steadily increases, though their output is necessarily determined by their numbers. Economic Entomology is still but a youthful branch of applied science, and every new entomologist who starts investigations in any part of the world throws more work on our abstracting and recording staffs, and often leads to further requests for identifications. The vast number of different species of insects now living in the world is rarely appreciated. The number represented in the National Collection has been roughly estimated at 300,000, and it seems probable that that is little more than one-tenth of those that actually exist.

Identification of Insects.

The need of entomologists for assistance in the naming of insects shows no signs of falling off; indeed, during the year under review the number of specimens received reached the high figure of 116,783, as compared with 101,728 in the previous year and an average of 98,532 for each of the five years before that. These insects were sent in by 193 (207) different correspondents, who were geographically distributed as follows: Africa 44 (53), America 26 (17), Asia 41 (55), Europe 58 (63), Oceania 24 (19), all the numbers in brackets being those for the previous year.

The lists of identifications sent out totalled 348 (359), comprising 7,767 (7,270) specific names. The actual numbers of identifications sent to the various Dominions, Colonies and other territories are as follows:—

Africa	Union of South Africa	177	(181)		
	Southern Rhodesia	72	(101)		
	Sudan	199	(415)		
	Gold Coast	25	(66)		
	Kenya	870	(455)		
	Nigeria	203	(501)		
	Nyasaland	45	(59)		
	Sierra Leone	345	(310)		
	Uganda	298	(143)		
	Tanganyika Territory	263	(343)		
	Other Territories	536	(120)		
				3,033	(2,694)
America	Canada	51	(—)		
	West Indies	397	(95)		
	Other Territories	210	(84)		
				658	(179)
Asia	India and Burma	934	(814)		
	Ceylon	37	(24)		
	Cyprus	82	(64)		
	Malaya	430	(625)		
	Palestine	498	(407)		
	Other Territories	996	(903)		
				2,977	(2,837)

OCEANIA ..	Australia and New Guinea ..	315	(207)		
	New Zealand	64	(86)		
	Fiji	16	(80)		
	Solomon Islands	127	(335)		
	Other Islands	55	(31)		
				577	(739)
EUROPE	United Kingdom	201	(427)		
	Other Countries	321	(394)		
				522	(821)
				7,767	

It is doubtful whether more than two-thirds of the species received are actually determined, and arrears of unnamed material are consequently accumulating in our cabinets. The scope of the identification work is obviously conditioned largely by the number of entomologists on our staff, but is also restricted in various groups by the paucity of specialists competent to do the work.

The four entomologists on our staff engaged in identification have as usual received most cordial and valuable assistance from the British Museum specialists; but even their aid is inadequate for our needs, and we have a " panel " of outside specialists (mostly foreigners) to whom we submit specimens. Unfortunately during the year we have lost the services of five of these entomologists owing to death or ill-health, but even so the names on our list still amount to 73.

From the collections received thousands of named specimens are of course returned to the senders; but in addition to this, 39,200 (40,500) insects have been handed over to the British Museum, of which 292 (414) were types of species new to science, and among the remainder were 439 (614) named species not previously represented in the National Collection. Some 265 named specimens were also presented to Illinois University, U.S.A., and the Zoological Institute, Munden, Germany, for teaching purposes.

The need for a new journal to facilitate publication of the large numbers of new insects that are being discovered every year has again engaged the attention of the authorities of the British Museum, and a special sub-committee is examining the question.

" Review of Applied Entomology."

Dr. Neave reports that the 24th volumes (1936) of the two Series of the " Review of Applied Entomology," though comprising a rather larger number of pages, contained somewhat fewer abstracts. Exclusive of indices, the number of pages was 1,134 as compared with 1,096 in the previous year, and the abstracts numbered 2,710 as compared with 2,901. This apparent discrepancy is due, in part, to recent devices for saving space by grouping into one abstract reports by a number of authors, which under the older system would have been treated as separate abstracts.

The world's literature continues to grow at an alarming rate and in spite of an addition to the abstracting staff the struggle to keep up to date with the literature is a very severe one.

In spite of the fact that the sales of this journal in the previous year were the best on record, it is gratifying to be able to report a still further increase. In the case of Series " A," the number of subscribers has increased from 571 to 588, and in that of Series " B " from 436 to 447. There was also an increase in the demand for back numbers and in the receipts for advertisements with the result that the net cash receipts, which were £1,282 17*s.* 5*d.* in 1935, increased to £1,440 12*s.* 3*d.* in 1936.

" Bulletin of Entomological Research."

The 27th volume (1936) of this journal was considerably the largest yet published and contained 736 pages, as against 617 for the previous year, being illustrated by 21 (24) plates and maps. The main cause for this increase in size was that the whole of the first large part was devoted entirely to locust problems, and was issued specially so that the research work done by British investigators might be laid before the International Locust Conference held at Cairo in April. The Committee on Locust Control therefore contributed £115 to the cost of producing the part.

The 51 papers in the volume emanated from a wide range of countries, viz. :—United Kingdom 22, Tanganyika Territory 6, Australia 4, Palestine 3, Nigeria 3, Jamaica 2, and one each from Union of South Africa, Kenya, Uganda, Sudan, Sierra Leone, Northern Rhodesia, Nyasaland, British Guiana, United States, Russia and Denmark.

There was a slight falling off in the number of subscribers, which was 375 as against 381 ; but this was more than compensated for by the sales of back numbers and reprints, the total receipts having been £868 (£820 7*s.* 5*d.*), and the cost of production and distribution £755 13*s.* 2*d.*

" Zoological Record " Part " Insecta."

Volume 72 (Literature of 1935) was a little larger than in the previous year, containing 3,424 titles as against 3,405. The number of subscribers was 120, and the sales produced a profit to the Institute of £52 16*s.* 6*d.*, after deduction of amounts due to the Zoological Society of London. To this has to be added the annual contribution of £100 made to the Institute out of the " Zoological Record " Fund towards the cost of production.

Other Publications.

In February, 1937, the Institute published an interesting and important book by Mr. T. H. C. Taylor entitled " The Biological Control of an Insect in Fiji," this being sold at the price of 12*s.* per copy. The total cost of production was £258 18*s.* 9*d.*, to which The Royal Society contributed £100 and the University of London £50.

The Zoological Society of London made a further contribution of £50 to the funds of the Institute towards the cost of supervising the preparation of the new " Nomenclator Zoologicus," which made considerable progress during the year.

General Information Service.

As usual, many enquiries and requests for information were received during the year, and some idea of their scope may be gathered from the following examples :—

Enquiries were received from New Zealand regarding the probable cause of " yellowberry " in wheat, which is causing appreciable damage; suggestions were made as to possible methods of dealing with a Longicorn beetle which is doing serious injury to timbers in houses; and information was asked regarding quarantine legislation in other countries against the possible introduction of insects in aeroplanes.

A list of all the known pests of sunflower crops in Europe was supplied to University College, Cork, and those that might occur in Ireland were indicated.

The advisability of attempting to control lantana in teak forests by means of the Lantana Seed Fly was discussed with the Forest Entomologist, Dehra Dun, India. Advice was given as to methods of controlling *Monomorium* ants in houses in Bombay. Tea chests made of Scandinavian wood and badly damaged by insects were examined, and the identification of the beetle grubs made it possible to say definitely that the damage originated in India and not in Europe.

Information was supplied to South India regarding the distribution of all the known allies of the Cotton-stem Weevil.

An enquiry was received from Palestine regarding the possible risk of importing the Colorado Beetle with seed potatoes from Canada, and recommendations were made.

Further correspondence took place with Dr. R. H. Le Pelley, of Kenya, regarding his search in the Far East for parasites of the mealy-bug and the methods of handling the material.

Measures were suggested for the control of *Lasioderma* in tobacco stores in Tanganyika; and the Government Entomologist was supplied with information regarding suitable mills for grinding pyrethrum flowers and Derris roots, and also light traps for use in plantations.

The Department of Agriculture, Gold Coast, was informed as to the distribution and known methods of control of *Bixadus*, an important borer pest of coffee in West Africa.

Discussions took place with both Sir Louis Souchon and Sir William Garthwaite regarding the desirability of importing the giant toad into Mauritius for the control of a sugar-cane pest; the introduction was recommended.

The Department of Agriculture, Trinidad, was supplied with a complete list of all the insects known to attack the cacao plant in Brazil.

A report was sent to the Colonial Office on the proposed legislation in the West Indies to prevent the introduction of fruit-flies.

A discussion took place concerning the desirability of introducing from Fiji into Jamaica a predator of the Black Banana Weevil, and the measure was recommended.

Suggestions were made for methods to be adopted in controlling an outbreak of scale-insects on citrus in Cyprus.

Advice was sought regarding various insect pests by the Veterinary and Agricultural Officer, British Somaliland, and suggestions were offered.

The Director continued to serve on the Colonial Advisory Council on Agriculture and Animal Health, and also as a member of the Committee on Locust Control and the Tsetse Committee of the Economic Advisory Council. He and Dr. B. P. Uvarov also attended the Fourth International Locust Conference held in Cairo in April, 1936.

Visitors.

During the session of the Imperial Scientific Conference in September, 1936, many of the delegates visited the various sections of the Institute and examined the whole working of the organisation.

In addition to this a number of economic entomologists came to the Institute and discussed various problems in which they were interested:—E. R. Buckell (locusts) from Canada; A. Cuthbertson, Dr. W. J. Hall, from S. Rhodesia; Dr. C. F. C. Beeson from India; J. L. Froggatt from New Guinea; E. Ballard from Palestine; H. W. Bedford, F. G. S. Whitfield, J. W. Cowland, H. Wood, from the Anglo-Egyptian Sudan; C. F. M. Swynnerton, S. Napier-Bax, of the Tsetse Research Department, Tanganyika; H. Wilkinson, C. D. Knight, from Kenya; F. D. Golding, Dr. T. A. M. Nash, from Nigeria; G. S. Cotterell from the Gold Coast; Dr. J. G. Myers, H. E. Box, W. H. Edwards, from the West Indies; W. F. Jepson from Mauritius; H. W. Simmonds from Fiji; R. A. Lever from the Solomons; and Dr. J. G. Betrem from Java.

Locust Investigations.

The outstanding event of the year was the Fourth International Locust Conference held at Cairo in April, 1936, in the organisation of which the Institute took an active part. The Conference was very successful, 24 Governments being represented, mostly by experts in the locust problem. The Director of the Institute was elected as one of the Vice-Presidents of the Conference, and other members of the locust staff took an active part in the discussions. The status of the Institute as the International Centre for Anti-Locust Research was confirmed, and it was strongly recommended that all the countries which do not yet co-operate with the Centre should do so, particularly in the matter of compiling statistics of losses caused by locusts and grasshoppers, and in the submission of regular reports, which are analysed and summarised by the experts of the International Centre.

The fifth survey of the locust situation in Africa and Western Asia, during 1935, was published, and a similar survey for the year 1936 is ready for the press. These two surveys include bibliographical appendices of the world literature on locusts and grasshoppers, and contain 166 and 186 titles respectively.

The work of the locust laboratory was carried out under Dr. A. G. Hamilton, and consisted in the continuation of a long series of experiments on the influence of fluctuating temperatures and humidities on the development and life-cycle of three species of locusts. In addition, a grant from the Colonial Development Fund made it possible to expand the investigations on the mode of action of external poisons on locusts, and a chemist, Mr. S. T. P. Brightwell, was appointed to carry out this research for a period of two years.

Investigations on the behaviour of locusts in response to external stimuli, carried out under laboratory conditions in the Birmingham University during the previous year, have produced valuable results. It was, therefore, decided to send Mr. J. S. Kennedy for six months on the Red Sea coast in the Sudan, in order to test his conclusions in the field and to study in particular the microclimatic and other factors responsible for the transformation of the solitary phase into the swarming one. This work was successfully concluded and a report is being prepared for the press.

Field investigations on locusts were carried out by three entomologists. Mr. H. B. Johnston has completed his work in East Africa, and is now preparing a final report. Mr. A. P. G. Michelmore has continued his investigations on the Red Locust (*Nomadacris septemfasciata* Serv.) at a special field station on Lake Rukwa, Tanganyika Territory. During his absence in connection with the Fourth International Locust Conference, and on leave, observations at the station were continued without interruption owing to the co-operation of the Government of the Union of South Africa, who have loaned two of their locust entomologists for the purpose.

Field investigations on the Desert Locust (*Schistocerca gregaria* Forsk.) were continued by Mr. R. C. Maxwell-Darling, who has made extensive and arduous journeys in the Aden Protectorate, Hadramaut and the Trucial Coast of Oman, in order to survey certain areas which were suspected to be dangerous potential outbreak centres. These journeys have shed a great deal of light on the significance of the Arabian peninsula, and it appears possible now to concentrate attention on a few really important points.

The general progress made in the study of the locust problem in Africa and Western Asia has reached the stage at which the creation of a permanent organisation for the prevention of future locust outbreaks can be considered. Separate international schemes for the control of each species of locust are now being drafted, since a different set of countries is involved in each case, but it is intended to place the whole organisation on a uniform basis, with the Institute continuing to take a leading part in the correlation of work, and of the data obtained.

Library.

During the year 421 bound volumes and 1,308 pamphlets were added to the library, which now contains 9,269 bound volumes and 23,877 pamphlets. An analysis of the bound volumes by languages is as follows :—

English	4,635	French	1,291	Magyar	68	*Czech, Bulgarian,	
Danish	59	Italian	400	Polish	36	Serbian, Ukrainian,	
Dutch	323	Portuguese	221	Rumanian	8	Lettish, Georgian,	
Swedish	103	Spanish	368	Russian	518	Hebrew, Chinese,	
German	1,100	Finnish	30	Other Languages	*109	Japanese, etc.	

Parts of 600 serial publications were received during the year, the countries of origin being as follows :—

British Empire :		Foreign :	
United Kingdom ..	51	Europe	166
Overseas	170	Africa	9
		Asia and Polynesia ..	43
		U.S. and Territories ..	132
		C. and S. America ..	29

In considering these figures it should be remembered that in order to economise in binding, certain unimportant series are filed under one number in the pamphlet collection, and that the estimate of the total number of pamphlets is, therefore, a conservative one. The figures of serials do not include a number of periodicals which are regularly received but which, owing to the paucity of their entomological contents, are not filed (or registered).

In addition to the daily internal use of the library by visitors, 613 books and pamphlets were issued on loan, as well as 14 items lent to Farnham House Laboratory. Amongst Government Departments and other Institutions borrowing books were :

The Department of Scientific and Industrial Research, the Ministry of Agriculture, the British Museum (Natural History), the Imperial Mycological Institute, the Imperial Bureaux of —Animal Genetics, Animal Health, Agricultural Parasitology, Fruit Production, and Herbage Plants; the Agricultural and Horticultural Research Station, Long Ashton; the University of Aberdeen; the North and West of Scotland Agricultural Colleges; the School of Agriculture, Cambridge; Armstrong College, Newcastle-upon-Tyne; University College, Hull; the Liverpool School of Tropical Medicine; the London School of Hygiene and Tropical Medicine; the Royal Geographical Society; the Royal Entomological Society of London; the National Central Library; the Cambridge Philosophical Society; the Leicester Museum; the Royal College of Veterinary Surgeons; Imperial Chemical Industries; and the Research Department, Woolwich. Several commercial firms also borrowed books, and works sent overseas included those to Tanganyika, Austria, France, Italy, and Switzerland.

The catalogue of serial and official publications is maintained up to date (in quadruplicate) and at present comprises some 3,500 slips, many of which contain more than one entry. The author-catalogue has been maintained up to date for books and separates. During the year the entomological contents of 401 volumes were catalogued. The arrears amount to 2,164 volumes of serial publications, approximately 23 per cent. of the library, a proportion of these arrears having already been catalogued from separates.

SCIENTIFIC PAPERS PUBLISHED DURING THE YEAR BY MEMBERS OF THE STAFF OF THE INSTITUTE.

Bryant, G. E.—Some new injurious Phytophaga (Col.) from British East Africa.—Proc. R. Ent. Soc. London, 3 pp.

Ferrière, C.—Note sur un nouvel Eupelmid de Madagascar.—Livre Jub. Bouvier, 3 pp.

Schwedisch-chinesische Expedition nach China : Chalcididae et Pteromalidae.—Ark. Zool., 4 pp.

Two new egg-parasites of *Batocera* (Col.) in Malaya.—Bull. Ent. Res., 4 pp.

The parasites of the coffee leaf-miners (*Leucoptera* spp.) in Africa.—Bull. Ent. Res., 15 pp.

Hamilton, A. G.—The mechanism of respiration of locusts and its bearing on the problem of inhalation of poison dusts.—Bull. Ent. Res., 15 pp.

An abnormal mandible in the Desert Locust.—Proc. R. Ent. Soc. London, 2 pp.

Johnston, H. B.—Remarks on the experimental and biometrical study of phases.—Proc. Fourth Intern. Locust Conf., 9 pp.

JOHNSTON, H. B., and BUXTON, D. R.—Review of work in the East African area for 1935.—Proc. Fourth Intern. Locust Conf., 9 pp.

KENNEDY, J. S.—The humidity reactions of the African Migratory Locust.—Journ. Exp. Biol., 11 pp.

MARSHALL, SIR G. A. K.—Contribution à l'étude de la faune du Mozambique; voyage de M. P. Lesne: Curculionidae.—Mem. Mus. Zool. Univ. Coimbra, 53 pp.
Schwedisch-chinesische Expedition nach China: Curculionidae.—Ark. Zool., 8 pp.
Curculionidae attacking cultivated plants.—Bull. Ent. Res., 7 pp.
New injurious Curculionidae from South America.—Bull. Ent. Res., 5 pp.
New Indian Curculionidae.—Ind. For. Rec., 27 pp.

MAXWELL-DARLING, R. C.—The Desert Locust.—Sudan Notes, 8 pp.

MICHELMORE, A. P. G.—Plan for investigations on *Nomadacris septemfasciata*.—Proc. Fourth Intern. Locust Conf., 8 pp.

ULLYETT, G. C.—The physical ecology of *Microplectron fuscipennis* (Hym. Chalc.).—Bull. Ent Res., 23 pp.
Host selection by *Microplectron fuscipennis*.—Proc. Royal Soc., 39 pp.

UVAROV, B. P.—Notes on the genus *Oedipoda*.—Ann. Mag. Nat. Hist., 3 pp.
Some Orthoptera from Kashmir.—Opusc. Ent., 4 pp.
A new *Omocestus* from Spain.—Ann. Mag. Nat. Hist., 3 pp.
New Orthoptera from Cyprus.—t.c. 11 pp.
A new Tettigoniid genus from St. Helena.—t.c., 3 pp.
Moroccan species of the genus *Stenobothrus*.—t.c., 4 pp.
Tropical species of *Tropidopola*, St., and the past history of the genus.—t.c., 4 pp.
Some Acrididae from the Solomon Islands.—Treubia, 6 pp.
Studies in the Arabian Orthoptera. (1).—Linn Soc. J., 24 pp.
Biological and ecological basis of locust phases and their practical application.—Proc. Fourth Intern. Locust Conf., 11 pp.

UVAROV, B. P., and MILNTHORPE, W.—The locust outbreak in Africa and Western Asia in 1935.—Econ. Adv. Coun. Comm. Locust Control, London, 64 pp., 9 maps.

WILKINSON, D. S.—Microgasterinae: notes and new species.—Proc. R. Ent. Soc. London, 8 pp.
A new Palaearctic species of *Apanteles*.—Proc. R. Ent. Soc. London, 3 pp.

APPENDIX III

IMPERIAL MYCOLOGICAL INSTITUTE REPORT FOR 1936–37

The work of the Institute has continued during the year on the same lines as in the preceding year (Appendix II, Seventh Annual Report of the Executive Council of the Imperial Agricultural Bureaux) namely (i) investigation, (ii) identification, and (iii) the collection and dissemination of information.

Investigational Work.

As in earlier years the work has been restricted for the most part to the study of critical genera and species of fungi more or less of phytopathological importance. Dr. Wiltshire's paper entitled " The original and modern conception of *Stemphylium* " was accepted for publication in the *Transactions of the British Mycological Society*. Although the work of editing the *Review* occupies nearly all his time he has been able to extend his studies on critical genera to *Sporidesmium*. This genus, founded by Link on *S. atrum* in 1809, has been of very doubftul standing. Fries in his " Systema " (from which mycological nomenclature dates for this group) includes six species in the genus, one of which is *S. cellulosum*. Recently Lohman has established S. stygium as the imperfect stage of *Glonium clavisporium* giving excellent figures and descriptions; they show clearly that Lohman's fungus bears a close relationship to *S. cellulosum* and afford grounds for hoping that it may be possible to define *Sporidesmium* in this sense. Hitherto the genus has been used for a mixed group of species including some belonging definitely to *Alternaria*. A batch of valuable material received by him from Mr. G. R. Bates of Mazoe Experimental Station, Southern Rhodesia, has cleared up the position regarding *Alternaria* spp. on citrus very considerably; further interesting specimens have come from India.

Mr. Mason had to give the greater portion of his attention to heavy calls for identifications until Dr. Bisby joined the staff in January, 1937; the relief afforded enabled him to devote the last quarter of the year to the preparation of the general part of the third fascicle of the " Annotated Account of Fungi received at the Imperial Mycological Institute "; in this part an attempt has been made to establish a more correct method of classifying and naming Fungi Imperfecti and one better suited to the needs of applied mycology.

Practically the whole of Mr. Dade's time was claimed by the *Review*, of which he is Sub-Editor. He was able, however, to take up again the problem of the sexuality of *Ceratostomella* (*Ophiostoma*) *paradoxa* which he had published as a new species some years earlier. He was able also to continue critical studies on the genus *Aspergillus* and to name a number of species of the genus submitted for identification. His long experience as Mycologist in Gold Coast enabled him to furnish valuable notes on the diseases of cacao and cocoyams. He has also completed a revised " List of Gold Coast Fungi " to be published shortly.

Dr. Bisby, who joined in January, 1937, has given his time almost wholly to identifications including many soil fungi on which his earlier published work in Canada has established him as an authority. On the investigational side he is undertaking critical studies of the rust fungi (*uredineae*).

Identification Work.

Specimens and cultures of fungi, many being phytopathogenic, have been received in large numbers for identification, especially from Australia, Southern Rhodesia, Sierra Leone, Cyprus, Trinidad and Sudan. A number of cultures from New Zealand, India, Great Britain, Ceylon and Malaya, have been identified also, and during the last quarter many soil fungi from Canada.

Among the more interesting identifications were *Phytophthora cryptogea* from marigold and *Ph. hibernalis* from orange both from Victoria, *Ph.citrophthora*, *Ph. parasitica* and *Ph. cactorum* from citrus in Brazil, and *Ph. cambivora* from water lily (Nymphaea) in England. *Pythium afertile* and *P. periplocum* were identified from cotton in Sudan, *P. myriotylum* from ginger in Ceylon, *P. graminicolum* from maize in Malaya, *P. splendens* from Trinidad and *P. ultimum* from tulips in Denmark and from narcissus in Scotland. *Diplodia* (*Microdiplodia*) *citricola* was identified from lemon in Victoria and *Septoria citricola* Rug. from both lemon and orange in the same State. *Haplosporella hesperidica* was identified from orange fruit in Southern Rhodesia and *Cytospora sacchari* from coconut in Malaya. Among other interesting pathogenic fungi were *Corticium penicillatum* causing a thread-blight of coconut in the Solomon Islands, *Septoria fructigena* on passion-flower in South Africa, *Verticillium dahliae* on cotton in Uganda, *Phoma destructiva* on tomato in Guernsey, a new *Hendersonula* on Kauri pine in Queensland, a new *Coniella* on violet from the Centraalbureau in Holland and a *Guignardia* sp. (with a *Phyllostictina* stage resembling *Phoma citricarpa*) from grapefruit in Trinidad.

A tsetse fly (*Glossina palpalis*) was received from Tanganyika Territory parasitised by a species of *Empusa*. *Aspergillus flavus* was identified on a limacodid larva and *A. flavus* var. *rufa* on a dryinid parasite of a dictyophorid both from Sierra Leone.

The most interesting named specimens received were the very rare perithecia of *Rosellinia necatrix* developed in the laboratory on diseased apple roots in California.

Mr. R. H. Bunting has kindly described, figured and identified a number of penicillate fungi which were sent to him from the Institute.

The identification of fungi made at the Institute this year and in preceding years have enabled mycologists in the Colonies and Territories to complete lists of diseases of their economic plants. A second list for Tanganyika Territory was published in the *Kew Bulletin of Miscellaneous Information*, No. 3, 1936, and a complete revised list subsequently in the *East African Agricultural Journal* for January, 1937 (Vol. II, No. 4). The " Preliminary list of fungi and diseases of plants in Sierra Leone " and the " List of fungi collected in Sierra Leone " were published in the *Kew Bulletin*, No. 7, 1936. The " Revised list of plant diseases in Kenya Colony " was published in the *East African Agricultural Journal* for May, 1936 (vol. I. No. 6). The " Annotated host list of Uganda parasitic fungi and plant diseases " was begun (Part I) in the *East African Agricultural Journal* for March, 1937 (Vol. II, No. 5). " A list of the diseases of cultivated plants in Ceylon " was published by the Department of Agriculture as Bulletin No. 88 (January, 1936). The list of Cyprus fungi is now in the press and the list for Gold Coast has been completed.

Information Service.

Volume XV of the *Review of Applied Mycology* was issued and the index to Volume XIV was published in July. The cost of printing and distributing the *Review* for the financial year was £902 and the receipts from sales amounted to £698 as against the estimate of £660.

The total number of letters sent away was 1,630 (excluding those concerned with the distribution of the *Review*) of which over 500 were replies to specific inquiries for information. The number of books, pamphlets and reprints loaned during the year was 166, an increase of 52 over last year's total. The special grant of £100 for binding sanctioned on the estimates for 1935–36 was expended during the year, thereby adding much to the convenient use of the library.

As a result of a circular letter kindly sent by Sir Frank Stockdale, Agricultural Adviser to the Secretary of State, to the Directors of Agriculture in the Colonies and Dependencies, a considerable number of the earlier volumes and numbers of the *Review*, including those which are out of print, were seturned from store as being in excess of those in use. It was possible, therefore, to complete sets of the back volumes to meet requests from subscribers and to supply full sets when required.

Detailed information regarding the past and present distribution of the *Review* was furnished for the information of the British Commonwealth Scientific Conference.

Staff Changes.

In consequence of the restoration of contributions from some of the Dominions it became feasible to appoint a further Assistant Mycologist to give his whole time to investigation and identification. Dr. G. R. Bisby, Professor of Plant Pathology in the University of Manitoba, having expressed his willingness to be considered for the post, was appointed and joined the scientific staff on the 1st January, 1937.

An addition to the clerical staff being urgently needed Miss H. O. McFarlane, M.A., was appointed Junior Clerk on the 17th February, 1937, on a temporary basis.

Miscellaneous.

Mr. A. Sharples' valuable work entitled " Diseases and pests of the rubber tree " was published in the autumn of 1936. The publication of the " Diseases of the tall Coconut Palm " by the late Professor H. R. Briton-Jones, has unfortunately been deferred as the publishers to whom it had been submitted were not prepared to undertake the whole risk. It would appear that mycologists should not now undertake to write works on tropical plant diseases unless a subsidy in aid of publication or a definite guarantee of sales is assured in advance.

The inspection of banana plants passing through quarantine in the special glasshouse at the Royal Botanic Gardens, Kew, has been continued as has also the inspection of cacao plants raised from seed at the Gardens for the West African Colonies.

APPENDIX IV

FARNHAM HOUSE LABORATORY REPORT FOR 1936–37

The volume of work carried out at Farnham House Laboratory during the financial year 1936–37 was notably greater than in the previous year. One hundred and eighty-two shipments of beneficial insects, comprising a total of 22,338,360 specimens were dispatched to various Empire states and foreign countries, as shown in the following table :—

Country.	*Shipments.*	*Specimens.*
Great Britain	13	65,900
Canada	92	21,570,941
Australia	25	51,399
New Zealand	35	627,390
South Africa	8	2,450
Irish Free State	1	1,000
India	1	5,000
Cyprus	1	5,000
Mauritius	5	8,280
Foreign States	1	1,000
	182	22,338,360

The increase in the amount of material shipped was largely due to the discovery in Central Europe of exceptionally heavy infestations of the Pine and Spruce Sawflies; but it is due also to the general development of the work and the increased efficiency of the trained staff.

Funds were provided by Empire Governments for work on special projects as follows: Canada provided the sum of £3,103 4*s.* 8*d.*, which includes payments amounting to £246 9*s.* 5*d.* outstanding for work carried out during 1935/36, but does not include the amount of claims submitted for January—March, 1937, totalling £242 17*s.* 7*d.* As in the previous year, the allotment from Canada included contributions from the Province of Quebec and the Quebec Forest Industries Limited; the Forestry Commission provided the sum of £437 3*s.* 11*d.*, which amount includes a credit carried forward to 1937/38; New Zealand provided, from Cawthron Institute funds, the sum of £216 16*s.* 11*d.*, which includes £17 2*s.* outstanding from 1935/36, and from Government sources, the sum of £487 9*s.*4*d.*, which does not include an outstanding claim for £158 3*s.* 7*d.* for the quarter ending 31st March, 1937. The Mauritius Government provided the sum of £72 3*s.* 5*d.*, while the South African Government authorized work for which a claim of £5 10*s.* 8*d.* was submitted to cover the period ending 31st March, 1937. Sales of the Woolly Aphis parasite to private correspondents in England realised the sum of £4 8*s.* 9*d.*

The main projects undertaken by the Laboratory during the financial year 1936–37, were as follows:

INSECTS AFFECTING CEREAL AND FORAGE CROPS

WESTERN WHEAT-STEM SAWFLY (*Cephus cinctus*, Norton).

The preliminary survey required to determine suitable points for the collection of parasitized material was carried out in the summer of 1936 by Mr. D. Berryman. The material secured was examined at the Laboratory during the following autumn and winter. Forty-three consignments, comprising 263,447 cocoons of *Cephus* and 6,334 speciments of the parasite *Pleurotropis benefica*, were despatched to Canada, where they arrived in good condition.

The extremely unfavourable conditions that have prevailed for some years in certain sections of the Canadian wheat belt have been rather deterimental to the progress of the introduced parasites, though they have not been equally injurious to the Sawfly, owing to the wide distribution of the pest, which enables it to maintain itself in spite of bad local conditions. However, the most important of the introduced species has now survived several winters and may be regarded as established; though additional liberations will probably be required for some years, owing to the enormous area affected by the pest.

The European Wheat-stem Sawfly (*Cephus pygmaeus*) is now established in Ontario, to which it has spread from infested areas in the United States. Parasite introductions will therefore be required in this region.

INSECTS AFFECTING FOREST AND SHADE TREES.

Balsam Bark Louse (*Dreyfusia piceae*, Ratz.).

The study and collection of the natural enemies of species allied to the Balsam Bark Louse was continued by Mr. E. Cameron. Three consignments of the natural enemies of the pests, comprising 4,000 specimens of the Ladybird *Exochomus quadripustulata* and 7,500 speciments of the Agromyzid fly, *Leucopis obscura*, were despatched to Canada. During his visit to Canada in the summer of 1936, the Superintendent had the opportunity of examining infestations of *Dreyfusia* in the woods near Fredericton, N.B., and found that the introduced Agromyzid was abundant on affected trees. He was informed that the adults of the species have been seen flying in little clouds around the trees, like gnats, and although *Leucopis* may not alone be capable of preventing damage by the Bark Louse, it should, in conjunction with the other species being introduced, reduce considerably the importance of the pest in the Maritime Provinces.

Pine Shoot Moth (*Rhyacionia buoliana*, Schiff.).

A consultation with American colleagues engaged in a study of this important pest on the Continent, revealed the fact that some very important parasites that have never been found in Great Britain exist in Austria. Arrangements for collections were therefore made with Dr. G. Bergold, on behalf of the Forestry Commission and the Canadian Government. These provided 14,900 specimens of the polyembryonic Encyrtid, *Copidosoma geniculatum*, and 14,000 specimens of the Eulophid pupal parasite, *Tetrastichus turionum*. Half of the *Copidosoma* material was liberated in infested pine areas in the South of England; the remainder was despatched to Canada. The *Tetrastichus* material is being retained in cold storage and will be liberated in the summer of 1937, which is the normal time of emergence.

White Spruce Sawfly (*Diprion polytomum*, Htg.).

The difficult and extensive laboratory studies and field surveys connected with this tremendously important problem require a staff of several trained entomologists. In 1936, owing to the very heavy pressure of work, still further increased by the absence of the Superintendent in Canada, it was found impossible to assign more than one assistant to the project, the direction of which fell entirely on Dr. K. R. S. Morris. Thanks to his energetic conduct of the work and favourable conditions in the latter part of the year, the campaign proved very successful. Thirty-two consignments of material, comprising a total of 21,192,848 Sawfly cocoons and parasites were collected in Sweden, Hungary and Czechoslovakia. The Pine Sawfly, *Diprion sertifer*, many of whose parasites attack *D. polytomum*, provided the great mass of this material, but almost two hundred thousand cocoons of *polytomum* itself were collected. A consignment of *Diprion pini* was also obtained, through the courtesy of Professor W. Roepke of Wageningen, from infested pine areas in Holland.

During his visit to Canada, the Superintendent had the opportunity to visit, in company with Dr. Gibson and members of his staff, some of the districts in the Provinces of Quebec and New Brunswick infested by the Sawfly and was thus able to get a personal impression of the terrible

devastation caused by the pest in the Canadian forests. The immense damage caused by an insect so uncommon and innocuous in its native home illustrates what may be expected in all parts of the Empire, from the movement of injurious pests, now so greatly facilitated by modern methods of rapid transport between the various regions of the world.

Pine Sawfly (*Diprion* spp.).

A number of colonies of the important Chalcid parasite, *Microplectron fuscipennis*, Zett., which has not been found attacking Pine Sawflies in England, have been liberated in infested areas in Dorset and Suffolk. Subsequent studies of material from the Dorset area showed that the parasites already present had effected practically complete control, leaving the introduced species without hosts on which to reproduce. Further introductions can, however, easily be made when the occasion presents itself as a stock of the parasite is maintained at the Laboratory.

Holly Leaf Miner (*Phytomyza ilicis*, Curt.).

Work on the natural enemies of this pest is being continued by Mr. E. Cameron, who is carrying out a general study of its natural control in Great Britain, since it is a particularly suitable species for an investigation of this type. During the course of the season, 13,400 infested holly leaves, of which a large proportion contained parasites, were despatched to Canada, together with 150 speciments of the parasite *Chrysocharis boops*.

Pine Bark Beetles (*Myelophilus piniperda*, L., etc.).

Mr. H. S. Hanson has continued his studies of the Pine Bark Beetle on behalf of H.M. Forestry Commission. Plans have now been made for an extensive test of the methods devised to maintain the biological control of the Pine Beetle in managed woodlands throughout Great Britain. A preliminary paper on the subject has been prepared by Mr. Hanson and will appear in the "*Bulletin of Entomological Research.*" The results obtained to date indicate that it is possible to manage pine forests in such a manner as to favour the action of natural enemies at the expense of the Bark Beetle, and thus lessen the risk of outbreaks. The experiment is of great interest as it represents the first workable plan of forest management in which biological control is utilised against insect pests.

INSECTS AFFECTING GARDEN CROPS.

The Diamond-Back Moth (*Plutella maculipennis*, Curt.).

Work on this insect, which is a cabbage pest of world-wide distribution, was continued by Mr. J. Eliot Moss, assisted by Mr. D. C. Lloyd. Thirty-one shipments of material were made to New Zealand. These included 51,980 specimens of *Angitia fenestralis* and *A. cerophaga* and 25,410 cocoons of *Plutella maculipennis*, collected for parasites in the field. Seven shipments of the parasite *Angitia*, comprising 1,750 specimens, were also despatched to South Africa.

Mr. J. Eliot Moss has carried out careful field and laboratory studies on *Plutella* in the hope of solving the problem of the irregular and rapid variation in numbers observed in infestations of this pest. A paper embodying the results of this work is now in preparation.

During the course of the breeding work on the parasites of *Plutella* it has been found that two of the species of *Angitia* attacking the pest in England (*A. fenestralis* and *A. cerophaga*) will, under certain circumstances, interbreed, giving rise to intermediate forms. These intermediates have not, so far, been taken in the field in England; but the experiment is of great interest in connection with the definition of species in the genus *Angitia* and in the Ichneumonidae in general and it is hoped that the work can be continued.

Pea Moth (*Cydia nigricana*, Steph.).

Work on this pest, which is of considerable importance in some parts of Canada, was continued by Mr. E. Cameron. Four shipments, containing in all 28,500 *Cydia* cocoons, of which a good proportion was parasitized, were shipped to Canada. It is of interest to note that

Ascogaster quadridentatus one of the parasites of the Pea Moth, is an important natural enemy of the Codling Moth (*Cydia pomonella*). This fact is a striking illustration of the way in which the biological control work on various pests is sometimes connected.

INSECTS AFFECTING DECIDUOUS FRUITS.

Codling Moth (*Cydia pomonella*, L.).

At the request of the South African entomologists, a consignment of 700 specimens of the parasite *Ascogaster quadridentatus* was obtained from the United States, through the courtesy of the United States Bureau of Entomology, and despatched to Cape Town by Air Mail. Unfortunately, none of the parasites, which were sent as adults, survived the journey. It has since been discovered that the parasite is already established in South Africa, probably as a result of the shipments sent out from Farnham House Laboratory some years ago.

INSECTS AFFECTING CITRUS FRUITS.

False Codling Moth (*Argyroploce leucotreta*, Meyr.).

At the request of Dr. Naudé and Dr. Ullyett, a report on the parasites of the European members of the genus *Argyroploce* has been prepared and sent to South Africa, where the False Codling Moth is a serious pest of citrus fruits. Arrangements for a preliminary survey of this problem in England are now being made.

TROPICAL WORK.

Sugar-Cane White Grub (*Lachnosterna smithi*, Arr.).

At the request of the Mauritius Government, arrangements were made for the collection of the larvae of the interesting and important Elaterid predator, *Pyrophorus luminosus*, in Porto Rico. The authorities of the United States Bureau of Entomology were approached in regard to the matter and with great kindness and courtesy allowed Dr. K. A. Bartlett, one of their entomologists stationed in Porto Rico, to organise the collection and despatch the material, making no charge over and above mere out-of-pocket expenses. The work was admirably carried out, the method of packing being modified according to instructions transmitted from Dr. W. F. Jepson, who supervised the trans-shipment of the material. In all, 8,130 specimens of *Pyrophorus* were received alive from Porto Rico. A large number arrived alive in Mauritius, where they will be used as breeding stock.

In the hope of obtaining parasites of English White Grubs for introduction into Mauritius, arrangements are being made with H.M. Forestry Commission for the collection of grubs from forest nurseries in the Forest of Dean. An examination of this material revealed an unexpectedly high parasitism by the dipterous parasite, *Dexia rustica*. One hundred and fifty parasitized specimens were despatched to Mauritius and a careful study of the material still on hand is being made by Miss M. G. Walker, in the hope that when the factors governing the distribution and multiplication of the species are better understood it may be possible to devise methods for enhancing its efficiency in the field.

INSECTS ATTACKING WEEDS.

Ragwort (*Senecio Jacobaea*).

At the request of Dr. David Miller of New Zealand, special collections of the Ragwort Seed Fly (*Pegohylemyia seneciella*, Meade) were made by Mr. E. Cameron. These provided a total of 550,000 puparia of the Seed Fly, which were duly despatched to New Zealand and will, it is hoped, produce sufficient material for local studies.

AUSTRALIAN WORK.

Mr. S. Garthside, assisted by Mr. H. T. Rosenberg, has continued the work on projects assigned to them by the Commonwealth Council of Scientific and Industrial Research, at Farnham Royal, while Mr. F. Wilson has carried on cognate investigations near Hyères, on the French Riviera. Twenty-five shipments of beneficial insects, attacking various weed and plant pests, and comprising 51,399 specimens of 15 species of beneficial insects were despatched to Australia during the course of the year. These included natural enemies of St. John's Wort, Ragwort, Diamond Back Moth, Oak Aphis, and Pine Chermes.

MISCELLANEOUS.

A consignment of the egg parasite *Trichogramma* was despatched to Mr. P. Milne, a research worker studying at Munich under the direction of Professor Escherich.

RESEARCH WORK.

Dr. G. C. Ullyett completed his studies on the biology of *Microplectron fuscipennis* on 31st July, having been appointed as Entomologist by the South African Government. It is understood that Dr. Ullyett will specialize on biological control work. Earlier in the year Dr. Ullyett gave a paper embodying part of the results of his investigations at a meeting of the Royal Society, in whose *Proceedings* it was subsequently published ("*Proceedings of the Royal Society of London*," Series B, No. 817, vol. 120, pp. 253–291, May, 1936). A complete account of the work prepared by Dr. Ullyett was accepted by the University of London for the Degree of Philosophy in Entomology.

Miss M. G. Walker continued her studies on the problem of host relations, with special reference to the egg parasite *Trichogramma* and *Collyria calcitrator*, a parasite of *Cephus pygmaeus*. Papers giving the results of this work are in course of preparation.

Mr. D. C. Lloyd is continuing his studies on the problem of host selection in hymenopterous parasites, with special reference to *Ooencyrtus kuvanae*, How., the egg parasite of the Gipsy Moth. The results obtained have demonstrated clearly the existence in the parasite of a remarkable power of discrimination between suitable and unsuitable hosts. A paper on this work is being prepared for publication.

VISIT OF THE SUPERINTENDENT TO CANADA.

At the request of the Dominion Entomologist, the Superintendent of the Laboratory sailed for Canada on 13th June to attend the opening of the new Parasite Laboratory erected by the Canadian Government at Belleville, Ontario, returning on 1st August. The opening of the laboratory was attended by entomologists interested in biological control work from all parts of Canada and the United States, and gave an opportunity for a series of meetings devoted to the discussion of various aspects of the work. The Dominion Entomologist, Dr. A. Gibson, presided over the meetings, which were opened by the Superintendent of Farnham House Laboratory with an account of the history and work of Farnham Royal as an Imperial centre for operations in biological control. The meetings and informal discussions held at Belleville were of the greatest value to all the specialists who attended them, owing to the unrivalled opportunity they afforded for the discussion of practical and theoretical problems. After the meetings the Superintendent had many useful discussions regarding the organisation and progress of the work with Mr. A. B. Baird, in charge of the biological control work, and with the other entomologists at Belleville, Ottawa, Montreal, Quebec, and Fredericton, and, thanks to the special arrangements made by the Canadian authorities, was able to visit many areas infested by pests on which the staff at Farnham Royal is working. A special trip was made to the Gaspé Peninsula to inspect the Spruce forests

attacked by the imported Spruce Sawfly. A great many difficult technical and administrative problems were satisfactorily dealt with during the trip and the knowledge gained during the course of it will be of great value in the conduct of future work.

During the absence of the Superintendent the work of the Laboratory was efficiently directed by Mr. E. Cameron, with the assistance of Mr. R. C. Jeffery.

VISITORS.

Mr. W. F. Sellers, of the United States Bureau of Entomology, having been assigned to work on the parasites of the Pine Shoot Moth and the Larch Case Bearer in England, was invited to make Farnham House Laboratory his headquarters for the work, which began early in May and continued until the end of July. The opportunity of an exchange of views and a comparison of the methods used in biological control work, afforded by his visit, was much appreciated by all members of the staff. During part of this work Mr. Sellars was assisted by Mr. F. A. Squire, formerly entomologist to the Government of British Guiana.

Many casual visitors called to see the Laboratory and inspect the work. Among them were the Chairman of the New Zealand Council for Scientific and Industrial Research, seventeen delegates attending the British Commonwealth Scientific Conference, a party of the scientific staff of Rothamsted Experimental Station, and entomologists from the United States, Java, China, Egypt, Canada, India, and various parts of the British Empire.

STAFF.

Dr. K. R. S. Morris resigned as from 31st March, 1937. The total staff, including non-technical members, on 31st March numbered 12, the increased pressure of work having necessitated the appointment of J. Gunn as additional Laboratory Steward.

LIBRARY AND EQUIPMENT.

The library now includes 670 bound volumes and 4,010 separates. No equipment of importance has been purchased during the year.

Work on the Parasite Catalogue was greatly held up owing to the pressure of work connected with the heavy shipments and only about 5,000 cards were added.

APPENDIX V

PUBLICATIONS

1. ANNUAL REPORTS OF THE EXECUTIVE COUNCIL OF THE IMPERIAL AGRICULTURAL BUREAUX:

		s.	d.
FIRST REPORT:	1929–30	1	0
SECOND REPORT:	1930–31	1	0
THIRD REPORT:	1931–32	1	0
FOURTH REPORT:	1932–33	1	0
FIFTH REPORT:	1933–34	4	0
SIXTH REPORT:	1934–35	4	0
SEVENTH REPORT:	1935–36	5	0
EIGHTH REPORT:	1936–37	2	6

2. LIST OF AGRICULTURAL RESEARCH WORKERS IN THE BRITISH EMPIRE, 1937. .. .. 5*s.* 0*d.*

Obtainable from the Secretary, Executive Council, Imperial Agricultural Bureaux, 2 Queen Anne's Gate Buildings, London, S.W.1, and from H.M. Stationery Office at the addresses shown on cover.

THE JOURNAL OF DAIRY RESEARCH

Published by the Cambridge University Press on behalf of the Committee of Management. First issued in November, 1929.

	s.	d.
VOLUMES I to IV (each two parts)	25	0
Single parts	15	0
VOLUMES V to IX (each three parts)	25	0
Single parts	10	0

PUBLICATIONS ISSUED BY THE IMPERIAL INSTITUTE OF ENTOMOLOGY, 41, QUEEN'S GATE, LONDON, S.W.7

Bulletin of Entomological Research.

Published quarterly, and containing original articles on Economic Entomology. Issued post free.

	s.	d.
Annual Subscription (payable in advance)	30	0
Subscription to current volume received after 30th June	36	0
Separate parts	9	0
Back Volumes:— I (1910)-X	20	0
XI (1920)-XXIII (1932)	25	0
XXIV (1933) *et sqq.*	37	6
Bound Volumes (extra to above prices)	6	0
Binding cases only	3	6

Reprints of some of the papers published in this Journal are available. Prices on application.

Review of Applied Entomology.

Consisting of abstracts or reviews of all current literature on Economic Entomology throughout the world. Published monthly in two series:—

Series "A" dealing with insect and other Arthropod pests of cultivated plants, forest trees and stored products of animal and vegetable origin.

Series "B" dealing with insects, ticks, etc., conveying disease or otherwise injurious to man and animals. Issued post free.

	Series "A."		Series "B."	
	s.	*d.*	*s.*	*d.*
Annual Subscription (payable in advance)	30	0	15	0
Subscription to current volume received after 30th June	36	0	18	0
Separate parts	3	0	1	6
Annual Subject Index (when sold separately)	6	0	3	0
Subject Index—Vols. I-III	5	0	I-X 10	0
Back Volumes—Vol. 1 (1913)-VII	15	0	10	0
Vol. VIII (1920)-XXII (1934)	24	0	12	0
Vol. XXIII (1935) *et sqq.*	42	0	21	0
Bound Volumes (extra to above prices)	5	0	5	0
Binding cases only	3	6	3	6

The index to the current volume is not published until April (Series "B") or August (Series "A") of the following year.

Zoological Record—Part Insecta.

Published annually about July in each year and containing as complete a record as possible of the literature of the previous year, chiefly from the systematic standpoint.

	s.	*d.*
Annual Subscription (including postage)	15	6
Back Volumes:— Vols. LII (1915)-LVII (1920)	12	0
Vols. LVIII (1921) *et sqq.*	15	0

Postage extra.

Some of the Sections into which Volumes LXI–LXVII were divided are still available. Prices on application.

An Abstract of the Legislation in Force in the British Empire Dealing with Plant Pests and Diseases up to the Year 1920.

By E. Marguerite Ralfs, B.A. Med. 8vo. 65 pp. Paper Covers. Price, 2*s.* 6*d.* 1921.

Tsetse-Flies. Their Characteristics, Distribution and Bionomics, with some account of possible Methods for their Control.

By Major E. E. Austen, D.S.O., and Emile Hegh. Med. 8vo. 188 pp. With 5 plates and 19 figures. Paper Covers. Price, 7*s.* 6*d.* Postage 4*d.* extra. 1922.

The Phases of Locusts in South Africa.

By Prof. J. C. Faure. Roy. 8vo. 132 pp. Paper covers. With 6 coloured, 19 black-and-white plates and 1 map. Price 12*s.* (Reprinted from the Bulletin of Entomological Research, Vol. XXIII, Pt. 3. September, 1932.)

Locusts and Grasshoppers. A Handbook for their Study and Control.

By B. P. Uvarov. Imp. 8vo. Pp. xiii and 352. With 9 plates and 118 text figures. Bound in Buckram. Price 21*s.* net. Postage, inland, 7*d.*; abroad, 1*s.* 3*d.* 1928.

The Coconut Moth in Fiji. A History of its Control by means of Parasites.

By J. D. Tothill, D.Sc., T. H. C. Taylor, M.Sc. (Lond.), and R. W. Paine, B.A. Containing a full account of the successful campaign against this important coconut pest. Imp. 8vo. Pp. vi and 269. With 12 coloured and 22 black-and-white plates, 1 map, and 121 text figures. Bound in Buckram. Price, 31*s.* 6*d.* net. Postage, inland, 7*d.*; abroad, 1*s.* 3*d.* 1930.

The Biological Control of an Insect in Fiji.

By T. H. C. Taylor, M.Sc. (Lond.). An account of the Coconut Leaf-mining Beetle and its Parasite Complex. Royal 8vo. Pp. x and 239. With 23 plates, 2 maps and 17 text figures. Bound in cloth. Price 12*s.* Postage, inland, 6*d.*; abroad, 10*d.*

A List of the Entomologists Employed in the British Empire.

Prepared for the Third Imperial Entomological Conference, 1930. Med. 8vo. 16 pp. Paper covers. Price, 2*s.* 6*d.* 1930.

A Summary of Data Relating to Economic Entomology in the British Empire.

Prepared for the Third Imperial Entomological Conference, 1930, by S. A. Neave, M.A., D.Sc. Med. 8vo. 24 pp. Paper covers. Price, 2*s.* 6*d.* 1930. (At present out of print.)

Report of the Third Imperial Entomological Conference, 17th–27th June, 1930.

Med. 8vo. 59 pp. Paper covers. Price, 2*s.* 0*d.* 1930.

Report of the Fourth Imperial Entomological Conference, 19th–27th September, 1935.

Roy. 8vo. 70 pp. Paper covers. Price, 4*s.* 0*d.* 1935.

Orders may be sent direct to the Assistant Director, Imperial Institute of Entomology, 41, Queen's Gate, London, S.W.7, or through a bookseller.

PUBLICATIONS OBTAINABLE FROM THE IMPERIAL MYCOLOGICAL INSTITUTE KEW, SURREY

Journal

Review of Applied Mycology.

	s.	*d.*
Annual Subscription, 12 monthly parts, with title-page and index (post free)	*30	0
Single part	3	0
Title-page and index	4	0

Back volumes (with the exception of Vols. I, VII and VIII, which are out of print) can be supplied, postage extra.

* 24*s.* to subscribers in the British Commonwealth.

Occasional Publications

Annotated Account of Fungi Received at the Imperial Mycological Institute.

	s.	*d.*
List I	1	0
List II, Fasc. 1	1	0
List II, Fasc. 2	2	0
List II, Fasc. 3. General Part	1	0
Report on the Third Imperial Mycological Conference, 1934	2	0
Mycologists resident in the British Empire, 1938	1	0

PUBLICATIONS OF THE IMPERIAL AGRICULTURAL BUREAUX

I. Obtainable from the Imperial Bureau of Soil Science, Rothamsted Experimental Station, Harpenden, Herts.

Periodical Abstracts

List of publications and papers on Soil Science published in the Empire Overseas in :—

	s.	*d.*
1930	1	0
1931	1	0
1932	1	0
1933	1	0
1934	1	0

(The list for 1929 is out of print.)

Soil Research in the British Empire published during 1935	1	0

Soils and Fertilisers.

A comprehensive abstract journal of soil science published six times yearly.

	British Commonwealth.		*Foreign*	
	s.	*d.*	*s.*	*d.*
Ordinary edition	20	0	25	0
Special edition (printed one side only)	25	0	30	0
Both editions	40	0	50	0
Single copies, ordinary edition only	5	0	5	0

Discontinued Series.

The following series of multigraphed periodicals have now been incorporated in Soils and Fertilisers. Annual sets (some incomplete) are obtainable at the prices given below.

Publications relating to Soils and Fertilisers (monthly) 1935 (8 issues) 6*s.*; 1936 (10 issues) 7*s.* 6*d.*; 1937 (10 issues) 7*s.* 6*d.*

Monthly Letters. 1935 (10 issues); 1936 (12 issues); 1937 (11 issues); 4*s.* per annum.

Recent Developments in Soil Analysis (quarterly), Complete Sets, 8*s.*

Occasional Papers

Technical Communications.	*s.*	*d.*
10. The Arrangement of Field Experiments and the Statistical Reduction of the Results (by R. A. Fisher and J. Wishart)	1	0
14. Weights and Measures occurring in Agricultural Publications of the Empire Overseas	0	6
17. Proceedings of a Conference on Soil Science Problems, September, 1930	1	6
19. Air Survey in relation to Soil Survey (by R. Bourne)	1	0
20. Lucerne "Inoculation" and the Factors affecting its Success	1	6
23. The Reclamation of Alkali Land in Hungary (A. A. J. de'Sigmond)	1	6
24. Laterite and Laterite Soils	2	0
26. The Dispersion of Soils in Mechanical Analysis	2	0
27. Land Amelioration in Germany (by H. Janert)	2	0
28. Soil Erosion (by T. Eden)	2	0
29. Soil, Vegetation and Climate	2	0
30. The Determination of Exchangeable Bases in Soil	2	0
33. Organic Manures (by S. H. Jenkins)	2	0
34. Tropical Soils in relation to Tropical Crops	2	6
35. The Design and Analysis of Factorial Experiments (by F. Yates)	5	0
36. Erosion and Soil Conservation*	5	0
Annual Report: For the year 1929–30	0	6
" " 1930–31	0	6
" " 1931–32 (out of print)	0	6
" " 1932–33	0	6
" " 1933–34	0	6
" " 1934–35	0	6
" " 1935–36	0	6

* Joint publication of bureaux of Soil, Science and Pastures, and Forage Crops.

Bibliographies.

Bibliography on Tobacco	2	0
Bibliography on Coffee	2	0
Catalogue of Journals and Periodicals in the Library of Rothamsted Experimental Station	2	0

Special Publication.

The Katamorphism of Igneous Rocks under Humid Tropical Conditions (by the late Sir J. B. Harrison)	5	0

Bibliography of Soil Science, Fertilizers and General Agronomy, 1931–34	25	0
1934–37	25	0

II. Obtainable from the Imperial Bureau of Animal Health, Veterinary Research Laboratory, New Haw, Weybridge, Surrey.

Abstracting Journal

	s.	d.
The Veterinary Bulletin.		
1931. Vol. 1. Quarterly (1st Number, April)	7	6
Annual Subscription	20	0
Subsequent Volumes. Monthly (1st Number, January)	5	0
Annual Subscription (postage paid)	40	0
(Back Numbers still available.)		

Indexing Publication

Index Veterinarius—Four issues a year. First issue April, 1933. Annual Subscription (postage paid). Volumes I to III mimeographed, Volume IV onwards, printed	100	0
Back numbers are still available.		

III. Obtainable from the Imperial Bureau of Animal Nutrition, Rowett Research Institute. Bucksburn, Aberdeen.

Journal

	s.	d.
Nutrition Abstracts and Reviews. (Issued under the direction of the Imperial Agricultural Bureaux Council, the Medical Research Council and the Reid Library.)		
Subscription per Volume of 4 numbers	42	0
Per single number	13	0

Occasional Papers

Technical Communications.		
1. A. I. V. Silage	0	6
3. Recent Research on Forage Crop Cultivation, Fodder Conservation and Utilisation, at the Animal Breeding Institute of the University, Konigsberg	1	0
4. Problems of Animal Nutrition and Animal Husbandry in Northern Rhodesia	1	0
5. Recent Research in Poultry Nutrition, by A. R. G. Emslie	1	0
6. The Composition of Certain African Foods and Feeding Stuffs	1	0
7. Wheat: Pre-eminence as a Cereal Food, Nutritive Value; Relation to Health and Disease	1	0
8. Nutrition Research in the British Colonial Empire	1	0
9. Methods for the Chemical Analysis of Biological Material in Nutrition Investigations	1	0
Occasional Communications.		
1. The Effect of Climate on the Composition of Pasture Plants		—
2. Etiology of Endemic Goitre		—

IV. Obtainable from the Imperial Bureau of Plant Breeding and Genetics, Plant Breeding Institute, School of Agriculture, Cambridge.

Journal

	s.	d.
Plant Breeding Abstracts.		
Quarterly. Annual Subscription	*25	0
Single copies	7	6
Volume I (Nos. 1, 2 and 3 out of print) No. 4 available	7	6
„ II Out of print.		
„ III (Nos. 1, 2 and 4 out of print) No. 3 available	7	6
„ IV (Nos. 1, 2 and 4 out of print) No. 3 available	7	6
„ V (No. 2 out of print), Nos. 1, 3, 4 available	17	6
„ VI (complete)	20	0
„ VII (complete)	15	0
Numbers printed on one side of paper	16	0

* 20*s.* to subscribers in the British Commonwealth.

Occasional Papers

Indexes to Plant Breeding Abstracts.		
Subject Index to Vols. I to V of Plant Breeding Abstracts	5	0
Subject Index to Vol. VI of Plant Breeding Abstracts	2	6
Subject Index to Vols. VI and VII of Plant Breeding Abstracts	2	6

	s.	d.
Supplements to Plant Breeding Abstracts.		
Summary of Reports received from Countries exclusive of the British Empire, 1928–31 Supplement I	2	6
Summary of Reports received from Stations in the British Empire, 1932–35. Supplement II	5	0
Technical Communications.		
Plant Breeding in the Soviet Union. (Joint Publication with the Imperial Bureau of Pastures and Forage Crops	3	6
Vernalization and Phasic Development of Plants. (Joint Publication with the Imperial Bureau of Pastures and Forage Crops	10	0
Bibliographical Monographs.		
Wheat Breeding Bibliography. Part 2. (Part 1 out of print)	2	6
Breeding Varieties Resistant to Disease	2	0
Lodging in Cereals	0	6
Oat Breeding Bibliography	1	6
Rice Breeding Bibliography	1	6
Bibliography on Interspecific and Intergeneric Hybridisation in Relation to Plant Breeding	2	0
Account of the Research in Progress in the British Empire	3	6
Rye Breeding Bibliography	1	6
Bibliography on Breeding Sorghums and Millets	1	0
Bibliography of Baking Quality Tests	—	
Breeding Resistant Varieties, 1930–33 (Supplement)	2	0
The Experimental Productions of Haploids and Polyploids	5	0
The South American Potatoes and their Breeding Value	3	6
An Outline of Cytological Technique for Plant Breeding	1	6
Tobacco Breeding Bibliography	1	0
The Production of Induced Mutations—I. by X-rays. (In Press.)		

V. Obtainable from the Imperial Bureau of Pastures and Forage Crops, Welsh Plant Breeding Station, Agricultural Buildings, Alexandra Road, Aberystwyth, Wales.

Journal

	s.	d.
Herbage Abstracts.		
Vol. 7, 1937 (printed both sides)	15	0
Vol. 7, 1937 (printed one side only)	20	0
Vol. 8, 1938 { Published price	25	0
Vol. 8, 1938 { Price in Great Britain and British Commonwealth	20	0
Herbage Reviews.		
Vol. 5, 1937	10	0
Vol. 6, 1938	*15	0

* A reduction of 5*s*. will be given when Herbage Abstracts is also ordered.

Occasional Papers

Bulletins

		s.	d.
3.	The Breeding of Herbage Plants: Technique adopted at the Welsh Plant Breeding Station. June, 1931	3	0
6.	Research on Forage Crops in Soviet Central Asia, with Special Reference to Turkestan Lucerne. March, 1932	1	6
7.	Further Contributions on the Technique Employed in the Breeding of Herbage and Forage Plants. May, 1932	2	0
13.	Plant Breeding in the Soviet Union. November, 1933 (Joint publication with the Imperial Bureau of Plant Breeding and Genetics)	3	6
17.	Vernalization and Phasic Development of Plants. 1935. (Joint publication with the Imperial Bureau of Plant Breeding and Genetics)	10	0
18.	Grassland and Forage Crops in the Union of South Africa. October, 1936	3	0
19.	Production of Grass Seed. June, 1937	5	0
20.	Insects and Other Pests Injurious to Seed Production in Herbage and Forage Crops, by H. F. Barnes. June, 1937	2	6
21.	The Influence of Climatic Conditions on Type Composition, by N. Sylvén. June, 1937	1	0

Bulletins.—*continued.*

		s.	d.
22.	Technique Adopted in the Production of Grass Seed at the Welsh Plant Breeding Station by Gwilym Evans. July, 1937	5	0
23.	Production of Seed of Herbage and Forage Legumes. September, 1937	5	0
24.	Collection of Native Grass Seed in the Great Plains, U.S.A., by E. J. Crider and M. M. Hoover. September, 1937	2	0
25.	Erosion and Soil Conservation*	5	0

* Joint publication of bureaux of Soil Science and Pastures and Forage Crops.

VI. Obtainable from the Imperial Bureau of Horticulture and Plantation Crops, East Malling Research Station, East Malling, Kent.

Journal

		s.	d.
Horticultural Abstracts.	A quarterly abstract publication of current horticultural literature.		
	Vol. I. First issued, March, 1931. Nos. 2 and 3 each	1	6
	Vol. II. Nos. 1, 2 and 3 out of print. No. 4, single copy	1	6
	Vols. III to VII, each	15	0
	Vols. VIII and subsequent volumes. Annual Subscription	*25	0
	Single copy	6	6

* 20*s.* a volume or 5*s.* a number to subscribers in the British Commonwealth.

Technical Communications

		s.	d.
2.	Field Experiments in Horticulture. 1931. T. N. Hoblyn	2	0
3.	Investigations on the Standardisation of Citrus Trees by Propagation Methods. 1932	2	0
4.	Problems of Fruit Tree Nutrition. Possible Lines of Approach. 1933. T. Wallace	2	0
5.	The " Degeneration " of the Strawberry. 1934. D. Akenhead, R. V. Harris, G. H. Berkeley, A. M. Massee	2	0
6.	The Nutrition and Manuring of Soft Fruits. 1936. T. Wallace	2	0
7.	Vegetative Propagation of Tropical and Sub-tropical Fruits. 1936. J. St. Clair Feilden and R. J. Garner	2	0
8.	Horticultural Aspects of Woolly Aphis Control, together with a survey of the literature. 1936. R. M. Greenslade	2	6
9.	A Review of the Literature on Stock-Scion Incompatibility in Fruit Trees, with particular reference to pome and stone fruits. 1937. G. K. Argles	5	0

Occasional Papers

		s.	d.
1.	Technique in Pot Culture for Fruit Plants. 1933. Dr. T. Wallace	0	6
2.	Experimental Data on Orchard and Small Fruit Manuring. 1933. S. T. Antoshin	1	0
3.	Annotated Bibliography on Bitter-Pit. 1934	1	6

Proceedings of First Imperial Horticultural Conference, 1930.

Part II. Papers on the application of Science to Horticulture. 1931. 2*s.* Out of print, but the following separates are available, each — 0 3

Field Experiments in Certain Tropical and Sub-Tropical Crops in West Africa (Dr. E. J. Martin and W. H. Beckett).
Fruit Products and Associated Problems (Professor B. T. P. Barker).
Some Physiological Considerations in Horticulture (Professor V. H. Blackman).
Plant Physiological Work in the Tropics: Some of the Problems, with Special Reference to Cocoa and some Possible Lines of Attack (Dr. T. G. Mason and Dr. E. J. Maskell).
Soil and Survey Work as a Basis for Fruit Production in Irrigated Areas (Professor A. J. Prescott).

Part III. Papers on Progress in Fruit Storage Methods, 1931, 2*s.* 6*d.* Out of print, but the following separates are available, each — 0 3

Factors Influencing the Storage Qualities of Fruit (Dr. T. Wallace).
The Present Position of the Bitter-Pit Problem in Australia (W. M. Carne, H. A. Pittman and H. G. Elliott).
The Behaviour and Diseases of the Banana in Storage and Transport (Dr. C. W. Wardlaw and Dr. L. P. McGuire).
Problems of Storage and Transport (E. A. Griffiths).
Fruit Transport Problems in Canada (R. L. Wheeler).
The Infection and Invasion of the Apple Fruit by Fungi in Relation to the Problem of Storage (Dr. A. S. Horne).
Experiments on the Preservation of Citrus Fruits (Dr. W. J. Young and F. M. Read).

Other Publications.

	s.	d.
Index to Volumes I-X of the *Journal of Pomology and Horticultural Science*, 1933. Compiled by Bureau, published by the Editors of the *Journal of Pomology and Horticultural Science*.	5	0
Available from the Bureau	0	6
Old and new standpoints on senile degeneration, 1931. By A. P. C. Bijhouwer		

VII. Obtainable from the Imperial Bureau of Animal Breeding and Genetics, Institute of Animal Genetics, University of Edinburgh, King's Buildings, West Mains Road, Edinburgh.

Journal

	s.	d.
Animal Breeding Abstracts (quarterly) commencing April, 1933 .. Annual Subscription	*15	0

* As from Vol. 6 (1938) increased to 25*s*. and to 20*s*. for subscribers in the British Commonwealth.

Occasional Papers

Bibliography on the Biology of the Fleece, 1931	1	6
Bibliography on Fur Breeding (mimeographed), 1931	1	0
Bibliography on the Genetics and Sex Physiology of the Rabbit (mimeographed), 1931	1	0
The Physiological and Genetical Aspects of Sterility in Domesticated Animals, with Bibliography. 1932	2	6
The Technique of Artificial Insemination, 1933	2	6
Bibliography of the works of J. C. Ewart (free to subscribers of Animal Breeding Abstracts, Vol. 1), 1934	0	6
Animal Breeding in the British Empire. A Survey of Research and Experiment, 1934	2	0

Also obtainable from the Bureau:

The Genetics of the Horse, 1930. Reprinted from "Bibliographia Genetica"	0	6
Inheritance of Productivity in Farm Stock, 1935. Reprinted from "Empire Journal of Experimental Agriculture"	0	6
The Genetics of the Pig, 1936. Reprinted from "Bibliographia Genetica"	2	6

VIII. Obtainable from the Imperial Bureau of Agricultural Parasitology (Helminthology), Institute of Agricultural Parasitology, Winches Farm Drive, Hatfield Road, St. Albans, Herts.

Journal

	s.	d.
Bibliography of Helminthology. For the years 1930, 1931, 1932, 1933—		
Library Edition, bound in cloth	10	6
Stiff paper cover only	8	0
Helminthological Abstracts (1932 onwards). Issued in five or six parts per volume, each volume covering the literature published in a single year. Subscription per volume, payable in advance	30	0
Completed volumes bound in cloth	32	0

[Note from Vol. III (1934) this journal incorporates the *Bibliography of Helminthology* and is published by the Bureau instead of by the *Journal of Helminthology*.]

Other Publications

(*a*) The Root-infesting Eelworms of the Genus *Heterodera*. A Bibliography and Host List, viii + 99 pp., 2 plates.		
Library Edition, bound in cloth	8	6
Stiff paper cover only	6	0
(*b*)* The Helminth Parasites of Common Rats. By J. N. Oldham, 42 pp.	2	0
(*c*)* The Genus *Anguillulina* Gerv. & v. Ben., 1859, vel. *Tylenchus* Bastian, 1865. By T. Goodey, 106 pp., 117 figs.	6	0
(*d*) The Bursate Lungworms of Domesticated Animals. By T. W. M. Cameron, 36 pp.	5	0
(*e*) The Scope and Aims of the Imperial Bureau of Agricultural Parasitology. By B. G. Peters, 6 pp.; free on application.		

Helminthological Abstracts.—*continued.*

	s.	d.
(*f*) Recent Researches on Helminth Immunity. By Phyllis A. Clapham, 20 pp.	3	0
(*g*) The Pathology and Aetiology of Plant Lesions caused by Parasitic Nematodes. By T. Goodey, 34 pp.	5	0
(*h*) The Bearing of the Physiology of Parasitic Nematodes on their Treatment and Control. By G. Lapage. 21 pp.	3	0
(*i*) The Effects of Some Natural Factors on the Second Ecdysis of Nematode Infective Larvae. By G. Lapage	4	0

Notes and Memoranda.

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* These appeared originally in the *Journal of Helminthology* and are now issued separately in stiff paper covers.

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